05
DIABETES AND OBESITY

Principal Investigator

Professor Juliana Chan (Chair Professor, Department of Medicine and Therapeutics; Director, Hong Kong Institute of Diabetes and Obesity, CUHK)

Team

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Research Progress Summary

Genome and Epigenome Wide Association Study

The team's ongoing Theme-based Research Scheme (TRS) has an overarching goal to use multi-omic and functional analysis to discover genetic regulation of cardiovascular-renal complications in type 2 diabetes (T2D). A genetic analysis of over 6,000 DNA samples from the Hong Kong Diabetes Registry has now completed by the team, including subjects who developed vascular complications (coronary heart disease (CHD) and/or subjects with end stage renal disease (ESRD) in comparison with individuals without such complications. Through this effort, the team has discovered a panel of genetic variants showing highly suggestive association ($p<10^{-5}$) with cardiovascular or kidney complications in diabetes. These variants are currently undergoing validation in other independent samples and collaborating cohorts while another 7,000 samples from the Hong Kong Diabetes Biobank had been recently genotyped. Collectively, this represents one of the largest resource and datasets in the field, focused on investigation of the genetic basis of diabetic complications. The team anticipates the insights gained from these discoveries will help improving the clinical care of patients with diabetes.

Multi-omic analysis and the Hong Kong Diabetes Biobank

The team is undertaking a large-scale epigenome-wide association study to identify epigenetic markers associated with diabetes complications. The team has utilised the Illumina 450 methylation arrays to interrogate DNA methylation patterns in 400 patients with incident CHD, 400 patients with incident ESRD, and 600 patients without these complications despite having at least 10 years of disease. This analysis, in collaboration with Professor Kevin Yip and his team, has led to the discovery of novel methylation markers associated with diabetic complications, which are currently being validated. The group has also applied the Agilent SurePrint G3 Human miRNA high-definition arrays to identify circulating microRNAs associated with diabetic complications. Led by Professor Stephen Tsui from the School of Biomedical Sciences, the project team is currently integrating these multi-omic data, using data mining to predict their correlations with gene expressions and phenotypes.

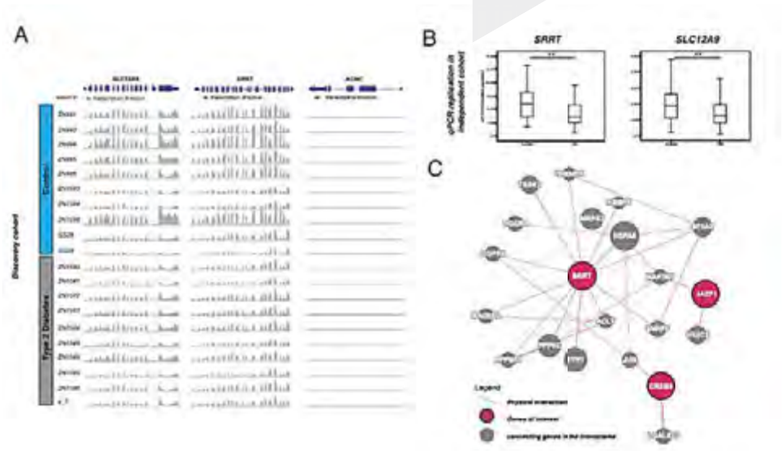
Modelled after the Hong Kong Diabetes Registry and in collaboration with 10 diabetes centres in Hong Kong, the team has built the Hong Kong Diabetes Biobank with prospective cohorts, databases and multiple biosamples. To date, the team has already recruited over 11,000 subjects and customised a biobanking programme for cataloguing and tracking the stored samples, to be used for discovery and replication purposes.

Molecular mechanisms of cardiovascular-renal complications

In collaboration with Professor Yu Huang from the Institute of Vascular Medicine and School of Biomedical Sciences, the team is investigating the pathobiological role of the peroxisome proliferator-activated receptor δ (PPARδ) pathway in relation to the team's multi-omic dataset on diabetic complications. To further explore the pathobiological role and clinical significance of the tumour growth factor β (TGF-β)/Smad3-dependent pathways, the team is also collaborating with Professor Hui-yao Lan to tally these experimental data with the team's genomic datasets and samples in subjects with diabetic kidney disease.

Novel methodology and genotype-phenotype-treatment-outcome analysis

Through the TRS, the team has assembled a team of data and clinician scientists to develop data mining methodologies to test hypotheses based on prior knowledge and make novel discoveries. In collaboration with Professor Weichuan Yu from the Hong Kong University of Science and Technology (HKUST), novel analytic tools are being applied to examine higher-order interaction in genetic association studies. This approach has the potential to identify novel SNP-SNP effects that would otherwise be missed using conventional analytical approaches. In collaboration with Professor Xiaodan Fan from the Department of Statistics, new statistical methods are being developed for detecting genotype-phenotype interaction. These methodological approaches will be highly relevant to the team's ongoing big data analysis.



In an experiment using whole transcriptome data of peripheral blood mononuclear cells from 10 patients with young onset type 2 diabetes (T2D) and 10 control subjects, we used extensive datamining to discover that the GWAS significant T2D SNP rs7636 could be functionally explained by repression of SRRT and SLC12A9, lending support to the use of multi-level data and computational analysis to uncover regulatory pathways linked to GWAS signals.

(A) rs7636 is in perfect LD with rs11171 (SRRT), rs781190 and rs1716255 (SLC12A9) in Beijing Han Chinese in the CSHL-HapMap project (r2: 1; D':1). Both SRRT (log2fold -0.88, adjusted p: 1.24E-4) and SLC12A9 (log2fold -0.77, adjusted p: 6.32E-3) were significantly down-regulated in T2D. Expression of ACHE was not altered (log2fold 0.19, adjusted p: 1.00). (B) The dysregulation of expression of SRRT and SLC12A9 were replicated in the independent cohort. Statistical significance in change of gene expression: * p<0.05, **p< 0.01, ***p< 0.001. (C) Physical interaction of SRRT, JAZF1 and CREB5 among other proteins.

Gestational diabetes and developmental origins of diabetes

In collaboration with Professor Wing-hung Tam from the Department of Obstetrics and Gynaecology, the team is investigating the long-term effects of exposure to maternal hyperglycaemia and gestational diabetes. The team has recently completed a large-scale follow-up and metabolic characterisation of a cohort of offspring from mothers with or without gestational diabetes. This has facilitated the team's ongoing multi-omics studies in relation to gestational diabetes and developmental programming, including genome-wide association studies (GWAS) for gestational diabetes, maternal hyperglycaemia, birthweight and adiposity. Supported by a Research Grant Council (RGC) General Research Fund (GRF), the team has applied novel structural equation modelling to investigate the relationship between maternal hyperglycaemia and offspring adiposity. In collaboration with Professor Chris KC Wong from the Hong Kong Baptist University (HKBU) and supported by the Health and Medical Research Fund (HMRF), the team is also examining the relationship between early-life exposure to environmental pollutants and the risk of cardio-metabolic diseases later in life.

Diabetes and Polycystic Ovary Syndrome

Polycystic ovary syndrome (PCOS) is one of the commonest endocrine disorders among young women, with significant reproductive and metabolic consequences. Supported by a GRF, the team is currently conducting one of the largest longitudinal follow-up studies to characterise the development of diabetes and metabolic abnormalities among Chinese women with PCOS. Preliminary data from this project highlighted the alarming rates of developing diabetes and glucose intolerance among young women with this condition. The findings have been presented at a major International PCOS meeting held recently.

Mechanistic studies on beta cell biology

In the team's ongoing mechanistic study led by Professor Alice Kong and in collaboration with Professors Arthur Chung and Gang Xu from HKBU, the team has made significant progress in unravelling the roles of reactive oxidative stress on beta cell function and the protective effects of Sirtuin 3 (Sirt3), the latter being a mitochondrial protein deacetylase that regulates oxidative stress. In both cell-based and animal models under high fat and oxidative stress conditions, Sirt3 deficiency caused impaired glucose-stimulated insulin secretion via activation of the JNK pathway and peroxisome proliferator-activated receptor gamma coactivator 1-alpha (PGC-1α) which is a major modulator of PAX4 expression, the latter being a key transcription factor in beta cell biology. To take this project forward, the team has signed a material transfer agreement with Professor Johan Auwerx from Switzerland to import pancreatic-specific Sirt3 floxed mice for future experiments to investigate the role of Sirt3 in pancreatic beta cells. Given the importance of oxidative stress in diabetes and its complications, this model will provide a useful tool for testing various anti-diabetic compounds and their effects on expression which will complement the team's ongoing multi-omic analysis and may lead to discovery of novel pathways and drug targets. The team has started collaboration with Professor Guy A. Rutter from Imperial College London, United Kingdom and invited Professor Rutter to deliver a talk titled "Control of pancreatic beta cell identity in health and type 2 diabetes" on 11 November 2016. Further to this talk, Professor Rutter will visit the team in May 2017 to consolidate the collaboration with support from the Research Committee, Faculty of Medicine Distinguished Scholar Scheme. Moreover, the team has also been working with Professor Andrew Miller from HKUST to use zebrafish as an efficient platform to characterise the functional significance of novel genes for diabetes focusing on beta-cell biology.

Diabetes and cancer

Diabetes, cancer and obesity are complex and closely associated chronic diseases though the nature of these associations needs clarification. In collaboration with Professors Chun-kwok Wong from the Department of Chemical Pathology and Professor Paul Chan from the Department of Microbology, the team has developed a virus-induced cancer animal model to examine the effects of hyperglycemia and various anti-diabetic and anti-inflammatory drugs on the initiation, promotion and progression of cancer. In a series of novel experiments, the team has demonstrated the differential effects of metformin, a biguanide and an incretin analogue on cancer growth despite similar blood glucose lowering through immunomodulation involving the cytotoxic and regulatory T cells. These findings highlight the pleotropic effects of anti-diabetic drugs and given the rising trend of all-site cancer in diabetes and the proliferation of anti-diabetic drugs, these animal models will provide a useful tool for testing hypothesis with clinical implications. In addition, the team has successfully obtained funding from the Innovation and Technology Commission (ITC) to conduct a project titled "Early Detection of Liver Cancer in Type 2 Diabetes Using Serum MicroRNA" with Professor Alice Kong as Principal Investigator, Professor Juliana Chan and Ronald Ma as Co-Investigators. The results of this project may lead to identification of novel biomarkers with breakthrough in the early and non-invasive diagnosis of patients with liver cancer by testing their peripheral blood.

Academic exchanges and capacity building

The group is currently training a dozen or more postgraduate students, who are working in inter-related projects, supported by the TRS, RGC, HMRF, private funds and CUHK postgraduate studentships.

1. Collaborations with The Surrogate Markers for Micro- and Macro-vascular Endpoints for Innovative Diabetes Tools (SUMMIT) Consortium (Leif Groop, Lund University, Sweden and Mark McCarthy, Oxford University, UK) and The Fenofibrate in Event Lowering in Diabetes (FIELD) Study Cohort (Tony Keech, University of Sydney, Australia) for cross validation of loci associated with diabetic complications.
2. Joint analysis with the Genetic Investigation of ANthropometric Traits (GIANT) Consortium in one of the largest genetic projects to date, a multi-ethnic meta-analysis of GWAS of obesity traits with around 1 million individuals.
3. Participation in other international consortia on multi-ethnic genetic studies for diabetes, gestational diabetes and related metabolic diseases including the T2D Portal funded by the Foundation of the National Institute of Health as well as collaboration with Bendix Carstensen and Dorte Vistisen at the Steno Diabetes Center, Denmark for a East-West comparative study on diabetic nephropathy.
4. Collaboration with the Diabetes Research on Patient Stratification (DIRECT) Study (Ewan Pearson, University of Dundee, UK) which is a pan-European Consortium funded by the Innovative Medicines Initiative to discover biomarkers and clinical subtypes associated with various treatment responses for precision medicine.
5. Collaboration with Cecilia Lindgren and Alex Drong of the Wellcome Trust Centre for Human Genetics for analysis of epigenome wide association study.
6. Collaboration with Professor Assam El-Osta from the Baker IDI Heart and Diabetes Institute and Monash University, Melbourne, Australia and Professor Yu Huang of the Institute of Vascular Medicine, CUHK to identify epigenomic markers in diabetes patients with coronary heart disease.
7. Collaboration with the Early Growth Genetics (EGG) Consortium on the genetics of early growth and metabolic traits, and the Genetics of Diabetes in Pregnancy Consortium on the genetics of gestational diabetes.
8. Collaboration with Professor Johan Auwerx from Switzerland to use pancreatic specific Sirt3 floxed mice in future experiments.
9. Collaboration with Professor Philip Clarke, University of Melbourne, Australia to develop diabetes outcome models for cost-effectiveness analysis which will pave the way for economic analysis of precision medicine using clinico-genomic-treatment data.

Recognitions

Awards and Fellowships

Member's Full Name	Details
Claudia Tam	Travel grant to attend the Novo Nordisk Foundation Symposium on Early Growth Genetics and Metabolic Diseases, Copenhagen, Denmark, April 2016.
Guozhi Jiang	Travel grant to attend the 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting,Taipei, Taiwan, October 2016.
Greg Tutino	Conference grant from the Hong Kong Society of Endocrinology, Metabolism and Reproduction (HKSEMR) to attend and present at the 76th Scientific Sessions of the American Diabetes Association, New Orleans, USA, June 2016.
Noel Ng	Conference grant from the Hong Kong Society of Endocrinology, Metabolism and Reproduction (HKSEMR) to attend and present at the 14th Annual Meeting of the Androgen Excess –Polycystic Ovary Syndrome Society, Lorne, Victoria, Australia, November 2016.
Ming Wai Yeung	Travel grant to attend the 52nd European Association for the Study of Diabetes (EASD) Annual Meeting, Munich, Germany, September 2016.
Chenzhao Ding	Travel grant to attend the 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting, Taipei, Taiwan, October 2016.
Chenzhao Ding	Travel grant to attend the 17th International Congress of Endocrinology (ICE) and 15th Annual Conference of Chinese Society of Endocrinology (CSE), Beijing, China, August 2016.
Baoqi Fan	Travel grant to attend the 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting, Taipei, Taiwan, October 2016.

Grants and Consultancy

Full Name of PI	Project Title	Funding Source	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	Amount (HK$)
Ronald CW Ma	Maternal Exposure to Perfluorooctane Sulfonte (PFOS) and the Risk of Childhood Obesity and Metabolic Abnormalities in the Offspring- Analysis of a Longitudinal Birth Cohort	Food and Health Bureau - Health and Medical Research Fund	01/04/2016	31/03/2018	1,191,000
Ronald CW Ma	Accelerating Medicines Partnership Type 2 Diabetes Project- Genetic Variants for Type 2 Diabetes and Diabetic Complications in East Asians: The Hong Kong Diabetes Registry	Foundation for the National Institutes of Health	01/06/2016	31/05/2019	3,013,920
Juliana CN Chan	Identifying the Epigenomic Fingerprint of Coronary Heart Disease in Chinese Adults with Type 2 Diabetes	National Health and Medical Research Council - National Natural Science Foundation of China Joint Research Scheme	01/06/2016	31/12/2020	RMB 3,500,000
Alice PS Kong	Early Detection of Liver Cancer in Type 2 Diabetes Using Serum MicroRNA	The Hong Kong Anti-Cancer Society	01/04/2016	01/03/2017	200,000
Alice PS Kong	Early Detection of Liver Cancer in Type 2 Diabetes Using Serum MicroRNA	Innovation and Technology Fund	01/01/2017	30/06/2018	1,396,790
Lorena TF Cheung (PhD student)	Lifestyle Factors and Their Relationships with the Weight and Glycemic Control in Non-obese and Obese Hong Kong Chinese Type 2 Diabetic Patients	Hong Kong Association for the Study of Obesity Research Grant 2016	01/01/2017	31/12/2018	50,000

Publications

A. Journal Papers

1. Luk AO, Ho TS, Lau ES, Ko GT, Ozaki R, Tsang CC, Kong AP, Ma RC, So WY, Chow FC, Chan JC. Association of self-reported recurrent mild hypoglycemia with incident cardiovascular disease and all-cause mortality in patients with type 2 diabetes: Prospective analysis of the Joint Asia Diabetes Evaluation Registry. *Medicine (Baltimore).* 2016; 95(45):e5183.
2. Yin J, Kong AP, Chan JC. Prevention and Care Programs Addressing the Growing Prevalence of Diabetes in China. *Current Diabetes Reports.* 2016; 16(12):130. (Review/Editorial)
3. Kong AP, Choi KC, Zhang J, Luk A, Lam SP, Chan MH, Ma RC, Chan JC, Wing YK. Curvilinear associations of sleep patterns during weekdays and weekends with glycemic control in type 2 diabetes: the Hong Kong Diabetes Registry. *Acta Diabetologica.* 2016; 54(2):151-62.
4. Li JW, Lee HM, Wang Y, Tong AH, Yip KY, Tsui SK, Lok S, Ozaki R, Luk AO, Kong AP, So WY, Ma RC, Chan JC, Chan TF. Interactome-transcriptome analysis discovers signatures complementary to GWAS Loci of Type 2 Diabetes. *Scientific Reports.* 2016; 6(1):35228.
5. Kong AP, Luk AO, Chan JC. Detecting people at high risk of type 2 diabetes- How do we find them and who should be treated? *Best Practice & Research Clinical Endocrinology & Metabolism.* 2016; 30(3):345-55. (Review/Editorial)
6. Fuchsberger C, Flannick J, Teslovich TM et al. The genetic architecture of type 2 diabetes. *Nature.* 2016; 536(7614):41-7.
7. Chan JC, Luk AO. Diabetes: A Cinderella subject we can't afford to ignore. *PLOS Medicine.* 2016; 13(7):e1002068. (Perspective)
8. Tutino GE, Yang WY, Li X, Li WH, Zhang YY, Guo XH, Luk AO, Yeung RO, Yin JM, Ozaki R, So WY, Ma RC, Ji LN, Kong AP, Weng JP, Ko GT, Jia WP, Chan JC; China JADE Study Group. A multicentre demonstration project to evaluate the effectiveness and acceptability of the web-based Joint Asia Diabetes Evaluation (JADE) programme with or without nurse support in Chinese patients with Type 2 diabetes. *Diabetic Medicine.* 2016; 34(3):440-50.
9. Chan JC, Gregg EW, Sargent J, Horton R. Reducing global diabetes burden by implementing solutions and identifying gaps: a Lancet Commission. *The Lancet.* 2016; 387(10027):1494-95. (Comment)
10. Horikoshi M, Pasquali L, Wiltshire S, Huyghe JR, Mahajan A, Asimit JL, Ferreira T, Locke AE, Robertson NR, Wang X, Sim X, Fujita H, Hara K, Young R, Zhang W, Choi S, Chen H, Kaur I, Takeuchi F, Fontanillas P, Thuillier D, Yengo L, Below JE, Tam CH, Wu Y, Abecasis G, Altshuler D, Bell GI, Blangero J, Burtt NP, Duggirala R, Florez JC, Hanis CL, Seielstad M, Atzmon G, Chan JC, Ma RC, Froguel P, Wilson JG, Bharadwaj D, Dupuis J, Meigs JB, Cho YS, Park T, Kooner JS, Chambers JC, Saleheen D, Kadowaki T, Tai ES, Mohlke KL, Cox NJ, Ferrer J, Zeggini E, Kato N, Teo YY, Boehnke M, McCarthy MI, Morris AP; T2D-GENES Consortium. Transancestral fine-mapping of four type 2 diabetes susceptibility loci highlights potential causal regulatory mechanisms. *Human Molecular Genetics.* 2016; 25(10):2070-81.
11. Nanditha A, Ma RC, Ramachandran A, Snehalatha C, Chan JC, Chia KS, Shaw JE, Zimmet PZ. Diabetes in Asia and the Pacific: implications for the global mpidemic. *Diabetes Care.* 2016; 39(3):472-85.
12. Imamura M, Takahashi A, Yamauchi T, Hara K, Yasuda K, Grarup N, Zhao W, Wang X, Huerta-Chagoya A, Hu C, Moon S, Long J, Kwak SH, Rasheed A, Saxena R, Ma RC, Okada Y, Iwata M, Hosoe J, Shojima N, Iwasaki M, Fujita H, Suzuki K, Danesh J, Jørgensen T, Jørgensen ME, Witte DR, Brandslund I, Christensen C, Hansen T, Mercader JM, Flannick J, Moreno-Macías H, Burtt NP, Zhang R, Kim YJ, Zheng W, Singh JR, Tam CH, Hirose H, Maegawa H, Ito C, Kaku K, Watada H, Tanaka Y, Tobe K, Kawamori R, Kubo M, Cho YS, Chan JC, Sanghera D, Frossard P, Park KS, Shu XO, Kim BJ, Florez JC, Tusié-Luna T, Jia W, Tai ES, Pedersen O, Saleheen D, Maeda S, Kadowaki T. Genome-wide association studies in the Japanese population identify seven novel loci for type 2 diabetes. *Nature Communications.* 2016; 7:10531.
13. Jiang G, Hu C, Tam CH, Lau ES, Wang Y, Luk AO, Yang X, Kong AP, Ho JS, Lam VK, Lee HM, Wang J, Zhang R, Tsui SK, Ng MC, Szeto CC, Jia W, Fan X, So WY, Chan JC, Ma RC. Genetic and clinical variables identify predictors for chronic kidney disease in type 2 diabetes. *Kidney International.* 2016; 89(2):411-20.
14. Jiang G, Luk AO, Yang X, Wang Y, Tam CH, Lau SH, Ozaki R, Kong AP, Tong PC, Chow CC, Chan JC, So WY, Ma RC. Progression to treatment failure among Chinese patients with type 2 diabetes initiated on metformin versus sulphonylurea monotherapy--The Hong Kong Diabetes Registry. *Diabetes Research and Clinical Practice.* 2016; 112:57-64.
15. Imai E, Ito S, Haneda M, Harada A, Kobayashi F, Yamasaki T, Makino H, Chan JC. Effects of blood pressure on renal and cardiovascular outcomes in Asian patients with type 2 diabetes and overt nephropathy: a post hoc analysis (ORIENT-blood pressure). *Nephrology Dialysis Transplantation.* 2016; 31(3):447-54.
16. Ma RC. Genetics of Cardiovascular and Renal Complications in Diabetes *Journal of Diabetes Investigation.* 2015; 7(2):139-54. (Review)
17. Ma RC, Schmidt MI, Tam WH, McIntyre HD, Catalano PM. Clinical management of pregnancy in the obese mother: before conception, during pregnancy, and post partum. *The Lancet Diabetes & Endocrinology.* 2016; 4(12):1037-49. (Series)
18. Horikoshi M, Beaumont RN, Day FR et al. Genome-wide associations for birth weight and correlations with adult disease. *Nature.* 2016; 538(7624):248-52.
19. Wu L, Cui L, Tam WH, Ma RC, Wang CC. Genetic variants associated with gestational diabetes mellitus: a meta-analysis and subgroup analysis. *Scientific Reports.* 2016; 6:30539.
20. Song C, Li J, Leng J, Ma RC, Yang X. Lifestyle intervention can reduce the risk of gestational diabetes: a meta-analysis of randomized controlled trials. *Obesity Reviews.* 2016; 17(10):960-9.
21. Leng J, Zhang C, Wang P, Li N, Li W, Liu H, Zhang S, Hu G, Yu Z, Ma RC, Chan JC, Yang X. Plasma levels of aminotransferase in the first trimester identify high risk Chinese women for gestational diabetes. *Scientific Reports.* 2016; 6:27291.
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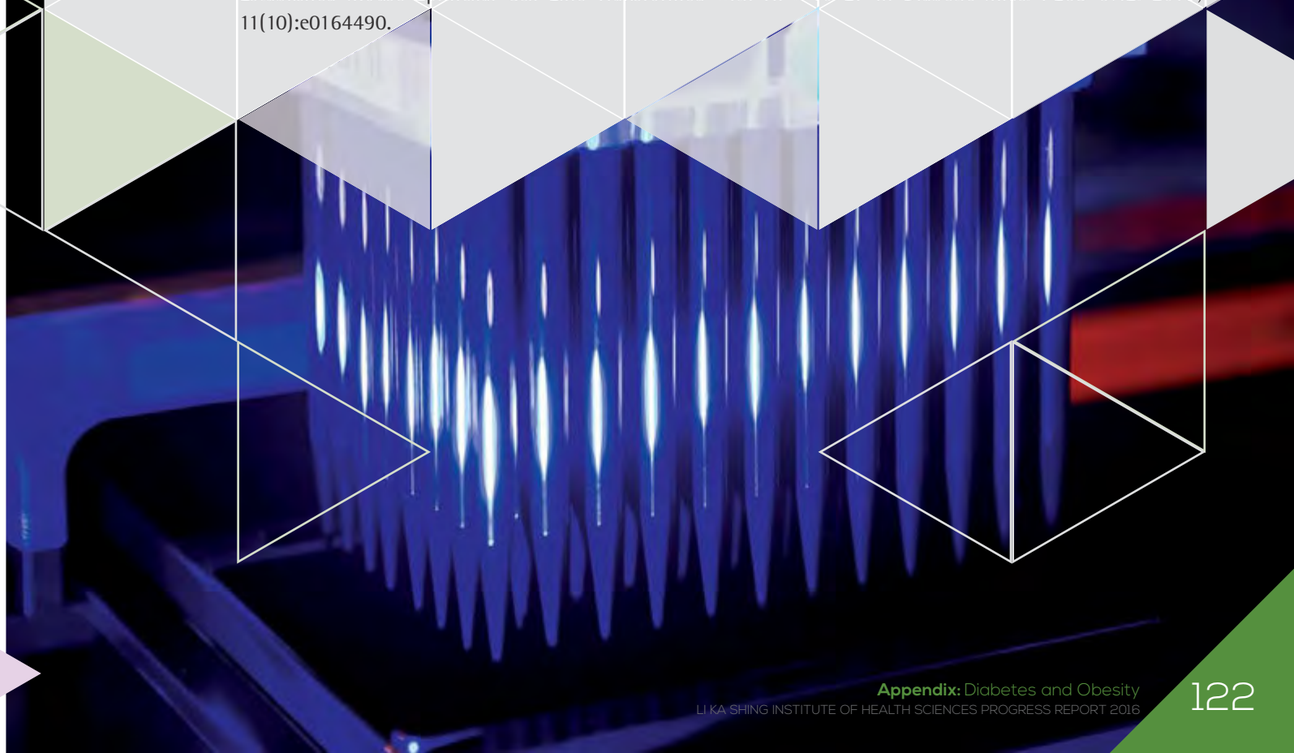

B. Conference Papers

1. Hu M, Tam HT, So WY, Chan JC, Tomlinson BT, Ma RC. Genetic variants and lipid traits in the Hong Kong Chinese patients with type 2 diabetes. In: *The 84th European Atherosclerosis Society Congress*; Innsbruck, Austria; 2016 May 29-Jun 1.
2. Ma RC, Tam CH, Lee HM, Lim CK, Ng AC, So WY, Song X, Chan JC, Tam WH. Genetic factors for hyperglycaemia and impaired beta-cell function in Chinese. In: *The Novo Nordisk Foundation Symposium on Early Growth Genetics and Metabolic Diseases*; Copenhagen, Denmark; 2016 Apr 20.
3. Tam CH, Lee HM, Lim CK, Ng AC, So WY, Chan JC, Song X, Tam WH, Ma RC. Novel genetic link between fetal adiposity and later risk of cardiometabolic disease in a Chinese population: an analysis of structural equation modeling. In: *The Novo Nordisk Foundation Symposium on Early Growth Genetics and Metabolic Diseases*; Copenhagen, Denmark; 2016 Apr 20.
4. Ma RC, Luan J, Cheung G, Lim CK, Wang Y, Lee HM, Tutino GE, Tam CH, So WY, Chan JC, Tam. WH. Persistence of differentially methylated regions in offspring exposed to mild intrauterine hyperglycaemia. In: *The 76th Scientific Sessions, American Diabetes Association*; New Orleans, USA; 2016 Jun 10-14.
5. Tutino GE, Tam CH, Yang XL, Ozaki, Kong AP, Chow CC, Tong PC, So WY, Sahota D, Ko GTC, Rogers MS, Cockram CS, Chan JC , Tam WH, Ma RC. Long-term maternal cardiometabolic risk using glycaemic indices and measures of adiposity during pregnancy – a 22 year follow-up study. In: *The 76th Scientific Sessions, American Diabetes Association*; New Orleans, USA; 2016 Jun 10-14.
6. Tutino GE, Tam CH, Ozaki R, So WY, Chan MH, Ko GT, Kong AP, Sahota D, Yang XL, Chan JC, Tam WH, Ma RC. Impact of maternal BMI on offspring cardiometabolic outcomes – a 22 year follow-up study. In: *The 76th Scientific Sessions, American Diabetes Association*; New Orleans, USA; 2016 Jun 10-14.
7. Tam CH, Hu M, Jiang G, Luk AO, Lee HM, Lim CK, Tsui SK, Huang Y, Lan HY, Szeto CC, So WY, Tomlinson BT, Chan JC, Ma RC on behalf of the TRANSCEND Consortium. A genome-wide association study identifies common genetic loci associated with lipid levels in Chinese patients with type 2 diabetes. In: *The 52nd Annual Meeting of the European Association for the Study of Diabetes*; Munich, Germany; 2016 Sep 12-16.
8. Ma RC, Tam CH, Jiang G, Luk AO, Lee HM, Lim CK, Tsui SK, Yu W, Tomlinson BT, Huang Y, Lan HY, Szeto CC, So WY, Chan JC on behalf of the TRANSCEND Consortium. Genome-wide association study identifies novel loci associated with End Stage Renal Disease among Chinese patients with Type 2 Diabetes. In: *The 52nd Annual Meeting of the European Association for the Study of Diabetes*; Munich, Germany; 2016 Sep 12-16.
9. Yeung MW, Luk AO, Kwok R, Wong GL, Shu SS, Ma RC, Chan HL, Chan JC, Wong VW, Kong AP. Risk score to predict advanced liver fibrosis in patients with type 2 diabetes. In: *The 52nd Annual Meeting of the European Association for the Study of Diabetes*; Munich, Germany; 2016 Sep 12-16.
10. Kong AP, Choi KC, Ding C, Zhang J, Luk AO, Ma RC, So WY, Cheung K, Wing YK, Chan JC. A randomized controlled trial to investigate the impact of sleep education program on glycemic control in Hong Kong Chinese type 2 diabetic patients with short sleep duration – An interim analysis at 6 months of intervention. In: *The 17th International Congress of Endocrinology (ICE) and 15th Annual Conference of Chinese Society of Endocrinology (CSE)*; Beijing, China; 2016 Aug 31-Sep 4.
11. Jiang G, Tam CH, Luk AO, Lee HM, Lim CK, Fan X, Lok S, Chan TF, Yip K, Tang N, Tsui SK, Yu W, Tomlinson BT, Huang Y, Lan HY, Szeto CC, So WY, Chan JC, Ma RC. Genome-wide association study in Chinese identifies new susceptibility loci associated with chronic kidney disease in type 2 diabetes. In: *The 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting*; Taipei, Taiwan; 2016 Oct 27-30.
12. Xie F, Jiang G, Tam CH, Luk AO, Lee HM, Lim CK, Kong AP, Lan HY, Szeto CC, So WY, Chan JC, Ma RC on behalf of the TRANSCEND Consortium. Association between GWAS-identified variants with CKD in Chinese with type 2 diabetes: The Hong Kong Diabetes Registry. In: *The 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting*; Taipei, Taiwan; 2016 Oct 27-30.
13. Ozaki R, Jiang G, Xie F, Lau C, Tsang P, Chan C, Lim CK, Luk AO, Tsang CC, Leung J, Li JK, Yeung VT ,Tsang MW, Kam G, Lau IT, Chow CC, Chow CC, Lee KF, Lau KP, Siu SC, Chan JC, So WY, Ma RC on behalf of the Hong Kong Diabetes Biobank Working Group. High prevalence of coronary heart disease and chronic kidney disease among Chinese subjects with Type 2 diabetes – The Hong Kong Diabetes Biobank. In: *The 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting*; Taipei, Taiwan; 2016 Oct 27-30.
14. Ding C, Lau E, Luk AO, Yeung T, Chan WS, Zhang J, Wing YK, So WY, Ma RC, Chan JC, Kong AP. Associations between insomnia and glycemic control in Hong Kong Chinese patients with type 2 diabetes In: *The 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting*; Taipei, Taiwan; 2016 Oct 27-30.
15. Ng YH, Cheung LP, Li TC, Huang J, Luk KH, Ma RC. Glucose intolerance and cardiometabolic risk factors in Chinese women with polycystic ovary syndrome. In: *The Androgen Excess and Polycystic Ovary Syndrome Society 14th Annual Meeting*; Lorne, Victoria, Australia; 2016 Nov 10-12.
16. Luk AO, Lau E, Cheung K, Kong AP, Ma RC, Ozaki R, Chow F, So WY, Chan JC. Poor glycaemic control is related to excess risks of hospitalization for infection in patients with type 2 diabetes: The Hong Kong Diabetes Registry. In: *The 52nd Annual Meeting of the European Association for the Study of Diabetes*; Munich, Germany; 2016 Sep 12-16.
17. Fan B, Luk AO, Lau E, Kong AP, So WY, Ma RC, Ozaki R, Chow F, Chan JC. Risks of Progression to end-stage renal disease among type 2 diabetic patients with albuminuric and non-albuminuric chronic kidney disease. In: *The 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting*; Taipei, Taiwan; 2016 Oct 27-30.
18. Wong K, Luk AO, Lee HM, Lau E, Cheung K, Kong AP, Ma RC, So WY, Chan JC. Association between CAG repeat length polymorphisms of androgen receptor gene, cardio-metabolic risk factors and clinical outcomes in Chinese men with type 2 diabetes. In: *The 11th International Diabetes Federation-Western Pacific Region Congress 2016 and 8th Asian Association for the Study of Diabetes Scientific Meeting*; Taipei, Taiwan; 2016 Oct 27-30.