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Etiology of diabetes – Current management and what can be planned for the future

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Diabetes does not discriminate boundaries. It is an epidemic worldwide. At the time diabetes is clinically diagnosed many patients present with diabetes related comorbidities and complications. Relative to the latter, researchers in the past decade explored early biomarkers for diagnosing and monitoring blood glucose and the response of pharmacological treatment in diabetic individuals. Since the dawn of the "OMICS" technology, many researchers reported proteins, metabolites and genes which may be promising candidate early predictors of diabetes and its complications. Lessons leant from fundamental research projects are that various endogenous biomolecules are promising candidates which can be developed as early tests for estimating the risks of developing diabetes and its various complications. A good diagnostic tool should be able to evaluate the risk of diabetes and its complication at an early stage of diabetes onset. Hence, detailed understanding of the pathogenesis of diabetes and its progression to complications allows us to map the biomolecules to the pathophysiology of type 2 diabetes.

Currently, the gold standard marker for diabetic nephropathy is the urinary ACR ratio along with estimated glomerular filtration rate (eGFR). ACR ratio of 30-300mg/g creatinine is labeled as microalbuminuria, indicating that structural damage has occurred in the kidneys. The American Diabetes Association (ADA) recommended that diagnosis of diabetic nephropathy (DN) can be made when at least two out of three measurements of urine ACR examined within 6 months are abnormal. eGFR is another component of renal excretory function which is calculated based on measured serum creatinine. It has been reported that by the time ACR becomes abnormal, eGFR is significantly reduced. Since the common aim in managing diabetes patients is to prevent diabetic nephropathy among all other complications, early risk predictors will be more beneficial compared to markers of kidney damage.

We performed a literature review and highlighted five serum biomolecules which have been evidently described as contributing pivotal roles in the pathophysiology of diabetic nephropathy. MiR-377, miR-99b, CYP2E1, TGF-β1 and periostin are potential candidates for designing an early biomarker array for screening and diagnosis of early stages of diabetic nephropathy. The five shortlisted biomolecules originate from endogenous biochemical processes which are specific to the progressive pathophysiology of DN. pathophysiology of DN is so complex, we hypothesize that a set of biomolecules representing the main pathophysiology pathways can be used to design an early biomarker array panel as a risk predictor for DN.

Recent Publications

1. Challenges Associated with Dengue Vaccine Development. / Jeyapalan, Sharanya; Fernando, Vanisha Naduni; Jahan, Nowrozy Kamar; Yap, Christina Gertrude; Pillai, Naganathan. In: Scientific Research Journal of Clinical and Medical Sciences, Vol. 1, No. 3, 30.11.2021, p. 11-18.

2. Review on Dengue Vaccines over the Years. / Fernando, Vanisha Naduni; Jeyapalan, Sharanya; Jahan, Nowrozy Kamar; Yap, Christina Gertrude; Pillai, Naganathan. In: International Academic Research Journal of Internal Medicine & Public Health, Vol. 2, No. 6, 10.12.2021, p. 11-18.

3. Enrichment protocol for rat models. / Ismail, Teh Rasyidah; Yap, Christina Gertrude; Naidu, Rakesh; Pamidi, Narendra. In: Current Protocols, Vol. 1, No. 6, 06.2021, p. e152.

Speaker Biography

Christina G.Y. obtained her Ph.D. from Monash University in 2012. In her Ph.D. research project, she explored candidates, and early predictors, for diabetic nephropathy. Her hypothetical candidate early predictor for diabetic nephropathy risk is CYP2E1. In her post-doctoral projects, she developed a targeted proteomic approach to quantitate CYP2E1 from human blood samples and assessed the applicability of this analytical method in clinical practice.

Currently, she is a senior lecturer (Metabolic Medicine) at the school of medicine, Monash University Malaysia in Kuala Lumpur Malaysia. She teaches Problem Based Learning (PBL), histology, physiology, and pharmacology in the MD, Bachelor of pharmacy, and the bachelor of human nutrition curriculums.

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