



The Singapore Bioimaging Consortium (SBIC)
presents a seminar

on

**"Effects of Genetic Variants, Nutrient Intake and Related Biomarkers
on Metabolic Abnormalities in Chinese"**

Speaker: Lin Xu
Professor, Principal Investigator
Institute for Nutritional Sciences
Shanghai Institutes for Biological Sciences
Chinese Academy of Sciences (CAS)

Date : Monday, 24 November 2014
Time : 2.00pm – 3.00pm
Venue : SBIC Seminar Room
11 Biopolis Way
Level 2, Helios Building, Singapore 138667
(Please use Level 1 entrance)

Abstract

Although unhealthy diet and lifestyle associated obesogenic environment, along with genetic predisposition, are considered as major drivers for the epidemic of metabolic diseases like obesity, type 2 diabetes (T2D) in Chinese people, limited prospective studies have systematically investigated major nutritional and genetic factors and their interactions on the disease epidemic among Chinese. Thus, we have adapted system epidemiologic approach (multiple omics) in a 6-yr population-based cohort study and also conducted several nutritional intervention trials. The major findings of our studies included: (1) Genetic Variants: by leading national genome-wide association study (GWAS) for T2D in Chinese Hans, we have discovered and confirmed more than 30 genetic variants associated with obesity, T2D and hypertension in Chinese Hans. Our study also showed ethnical differences for some of genotypes between Chinese and Caucasians. Furthermore, we also revealed that certain genetic variants involving essential fatty, vitamin D and iron metabolic pathways could modify levels of n-3 and n-6 fatty acids, 25(OH)D and ferritin, or cardiometabolic outcomes; (2) Nutrient intakes and related biomarkers: by establishing an erythrocyte fatty acid database, we have found significant geographic differences in the n-3 and n-6 PUFA distribution and only DHA, was inversely associated with MetS risk. The interactions between genetic variant on *FADS1* and 18:2n-6 or 18:3n-3 fatty acids could alter the risk of lower HDL cholesterol. Although with overall low erythrocyte trans fatty acids (TFA) concentrations, trans-18:1 isomers, the major form of TFAs, were strongly associated with dairy foods. Increased levels of trans-18:1 isomers and dairy intake were associated with 30-35% reduced 6-year T2D incidence, but the favorable effect of trans-18:1 isomers

on T2D risk was mainly explained by dairy intake. Whereas, non-dairy originated trans-18:2 levels were associated with dyslipidemia. In addition, our data suggested that a high carbohydrate intake may promote the yield of 16:1n-7 and other fatty acids from *de novo* lipogenesis (DNL) pathway. Increased levels of 16:1n-7 fatty acids were associated with a higher 6-year incidence of MetS and T2D. Evidence that low-carb intervention could inhibit the level of 16:1n-7 further suggested this fatty acids could be a potential biomarker for people with habitually high carbohydrate intake. In turn of micronutrients, we found that prevalence of vitamin D deficiency and insufficiency were 69.2% and 24.4%, respectively. Low plasma 25(OH)D was associated significantly with high MetS risk and insulin resistance which was more profound in overweight/obese people. Moreover, genetic variants in *GC* and *NADSYN1/DHCR7* could modify vitamin D metabolism and bioavailability and if individuals carried 5-6 risk alleles, their plasma 25(OH)D levels were 11.4 nmol/l lower (equivalent to take 450IU/d of vitamin D). In addition, we also found that elevated plasma ferritin was associated with heightened 6-year incident diabetes, independent of BMI, inflammation and many established confounders. However, T2D risk could be reduced by common variants in *TMPRSS6*, possibly mediated through lowering ferritin. Collectively, our studies provided important insights regarding the roles of genetic and nutritional factors/biomarkers in the pathogenesis of metabolic abnormalities among Chinese population.

About the Speaker

Dr Lin Xu is a Professor for the Institute for Nutritional Sciences at the Shanghai Institutes for Biological Sciences, Chinese Academy of Science (CAS) and Director of the Key Laboratory of Nutrition and Metabolism at CAS. Prior to her current role, she was a Postdoctoral Research Fellow of NIH/NIA and NIH/NIEHS in University of North Carolina at Chapel Hill and Duke University in USA. Dr. Lin's research mainly focuses on (1) effects of gene-gene, gene-environment factors (diet/lifestyle) and gene-phenotype, and their interaction on the development of metabolic syndrome and type 2 diabetes among Chinese population; (2) the predictive roles of diet and lifestyle factors, gene variants, nutritional biomarkers and cytokines in the onset of metabolic diseases; and (3) nutrition intervention trials for high risk individuals. As a corresponding author, she has published over 80 manuscripts in internationally reputable journals since 2007 and sits on the editorial board of a number of international scientific journals. Dr. Lin received her MD from Zhejiang Chinese Medical University, China and her PhD from Cornell University, USA.

--- Admission is free and all are welcome ---