Plenary Lecture

# Precision Medicine: Singapore's Story

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## Abstract

Precision medicine has been emerged as an innovative approach to transform healthcare. Unlike traditional "one-size-fits-all" medicine, precision medicine aims to tailor medical treatment to the individual characteristics of each patient. This approach has already shown promise in areas like oncology, rare diseases, and pharmacogenomics. Furthermore, by integrating genetic, environmental, and lifestyle factors, it also aims to develop targeted strategies for population screen, disease early diagnostics, and prevention.

Asian populations will, however, not be able to enjoy the full benefit of Precision Medicine due to the lack of genetic data for Asian population. Although housing over half of the world's population, Asian populations are significantly underrepresented in genetic research. This lack of genetic data undermines the development of accurate diagnostics, risk assessments, and therapies for Asians. To address this inadequacy, Singapore launched a National Precision Medicine (NPM) program in 2021. One of the major research effort of NPM is to sequence up to 10% of its local population. In my presentation, I will provide a brief introduction of Singapore's NPM program. I will further demonstrate how we have used the whole genome sequence data from NPM to analyze the genetic architecture of Asian population. Finally, I will discuss about our current research effort on generating Asian Reference Genomes to empower NPM programs in Singapore as well as Asia.

## Publication Highlights

**(1)** Lam M, **Liu JJ**, *et al.* Comparative genetic architectures of schizophrenia in East Asian and European populations. Nature genetics. 2019 Dec;51(12):1670-8.

**(2)** Wu D, **Liu JJ**, *et al.* Large-scale whole-genome sequencing of three diverse Asian populations in Singapore. Cell. 2019 Oct 17;179(3):736-49.

**(3)** Xu M, **Liu JJ**, *et al.* Genome sequencing analysis identifies Epstein–Barr virus subtypes associated with high risk of nasopharyngeal carcinoma. Nature genetics. 2019 Jul;51(7):1131-6.

**(4)** Chang X, **Liu JJ**, *et al.* Gene-diet interaction effects on BMI levels in the Singapore Chinese population. Nutrition journal. 2018 Dec;17:1-1.

**(5)** Gurung RL, **Liu JJ**, et al. Genetic markers for urine haptoglobin is associated with decline in renal function in type 2 diabetes in East Asians. Scientific Reports. 2018 Mar 23;8(1):5109.

**(6)** Tan DE, **Liu JJ**, et al. Genome-wide association study of B cell non-Hodgkin lymphoma identifies 3q27 as a susceptibility locus in the Chinese population. Nature genetics. 2013 Jul;45(7):804-7.