

PRESIDENT'S SCIENCE AWARD 2026

Assistant Professor Liu Boxiang

Presidential Young Professor, Department of Pharmacy and Pharmaceutical Sciences, Faculty of Science, National University of Singapore

“For his work in developing AI and bioinformatics methods that improve the identification of causal genes for complex diseases, enabling precision medicine approaches for human health.”

Dr Liu Boxiang is a computational biologist and geneticist who develops artificial intelligence (AI) and bioinformatics methods to uncover the genes that cause complex human diseases, with a particular focus on Asian populations that have long been underrepresented in genomic research. By pinpointing which genes drive disease, his work lays the groundwork for precision medicine — treatments tailored to an individual's genetic make-up.

Common diseases such as diabetes, autoimmune disorders and neurological conditions are each shaped by hundreds of small genetic differences. The overwhelming majority of these differences lie not within genes themselves, but in the vast non-coding regions of the genome that control how genes are switched on and off. Translating these signals into the specific genes responsible for disease is one of the central challenges of modern genetics. It is made harder by a long-standing bias: the computational tools and reference data underpinning the field were built largely on European-ancestry populations, and can give incomplete or misleading results when applied to the diverse populations of Asia.

Dr Liu's research closes this gap on three fronts — new data resources, new computational methods, and new tools for the wider scientific community. He spearheaded single-cell splicing QTL analysis, building the first atlas to map how genetic variation shapes RNA splicing within individual cell types, built from approximately one million blood cells from 474 East, Southeast and South Asian donors. The work, featured on the cover of *Nature Genetics*, uncovered an Asian-specific genetic variant that helps explain susceptibility to Graves' disease, a common autoimmune thyroid condition. He has since extended this approach to skeletal muscle and metabolic disease, and to nearly three million brain-cell nuclei to identify genes linked to neurological disorders.

To make such discoveries reliable and widely usable, Dr Liu developed LocusCompare2, a web platform now used by more than a thousand researchers worldwide to benchmark and reconcile the leading methods for linking genetic signals to causal genes. He also created DIRAC, a deep-learning model that integrates spatial and multi-omic data at the scale of millions of cells, published in *Nature Methods*. Together, these tools turn raw genetic signals into actionable insights about disease mechanisms and potential drug targets.

Dr Liu's contributions have been widely recognised, with his research cited more than 14,000 times. Within a single year he received three early-career honours — the Singapore National Academy of Science Young Scientist Award, the NUS Young Researcher Award, and the NUS Faculty of Science Young Scientist Award — and he was admitted to the National Research Foundation Fellowship Class of 2026 to pursue precision drug targets that correct disease-causing RNA splicing. He holds a Presidential Young Professorship at NUS, has secured

substantial competitive research funding as principal investigator, and has delivered keynote lectures and invited talks at scientific meetings around the world.

Beyond his own research, Dr Liu is committed to nurturing the next generation of scientists. He directs the Genomic Data Science Laboratory and the MGI-PPS Joint Laboratory at NUS, and mentors a team of doctoral students and postdoctoral fellows whose work has earned national and faculty awards. He has co-created and teaches several undergraduate and graduate modules that bring genomics, biostatistics and AI into the pharmacy and biomedical curricula, and he leads an industry-academia partnership that has brought advanced sequencing capabilities to NUS.

As a Young Scientist Award recipient, Dr Liu aims to ensure that the benefits of genomic medicine reach the populations most often left out of it. By building AI methods and data resources centred on Asian genetic diversity, he hopes to accelerate the discovery of new drug targets and bring precision medicine closer to patients in Singapore, across Asia and beyond.