

GIS SCIENTISTS WIN PSTA AND YSA 2020 AWARDS

Congratulations to Prof Liu Jianjun and Dr Chew Wei Leong!



From left: Dr Wan Yue (YSA 2015 winner), Prof Ng Huck Hui (PSA 2018 winner), Prof Patrick Tan (PSA 2015 winner), Dr Chew Wei Leong (YSA 2020 winner), Prof Liu Jianjun (PSA 2020 winner), Dr Li Jingmei (YSA 2017 winner), and Dr Khor Chiea Chuen (YSA 2013 winner). Who will be the 2021 award winner and occupy that empty seat?

18 December 2020 – Prof Liu Jianjun and Dr Chew Wei Leong were presented with the President’s Science Award (PSA) and Young Scientist Award (YSA) respectively for their contributions to the biological and biomedical sciences.

PRESIDENT’S SCIENCE AND TECHNOLOGY AWARDS (PSTA)

The PSTA are the highest honours bestowed on exceptional research scientists and engineers in Singapore for their excellent achievements in science and technology. These national awards are given annually to recognise and celebrate outstanding and invaluable contributions by individuals or teams to the research and development landscape in Singapore.

2009 marked the first year that the President’s Science & Technology Awards were presented. The awards, formerly known as the National Science & Technology Awards since 1987, were elevated to the status of the President’s awards to highlight and give due recognition to the important role research scientists and engineers play in Singapore. The prestige of the President’s awards underpins Singapore’s efforts to raise the level of excellence in research and strengthen the growing community of scientific talent in Singapore.

The President’s Science & Technology Awards is made up of three different awards, namely, the President’s Science & Technology Medal (PSTM), the President’s Science Award (PSA) and the President’s Technology Award (PTA). The winners of the respective awards have been carefully chosen through a rigorous process by a selection committee comprising key representatives from the government, industry, academia and public research institutes.

GIS’ PSA winner for 2020

Prof Liu Jianjun

Deputy Executive Director of GIS, and Professor at Yong Loo Lin School of Medicine, NUS



“For his outstanding contributions to genetic studies of Asian populations, which has advanced biomedical research and precision medicine, and benefited clinical practice in the prevention of diseases and adverse drug responses”

Professor Liu Jianjun is a leading human geneticist who studies Asian populations and has advanced the understanding of diseases and treatment outcomes among Asians through his work in the field. He is currently the Deputy Executive Director at the Agency for Science, Technology and Research’s Genome Institute of Singapore (GIS) and

Professor at the Yong Loo Lin School of Medicine, National University of Singapore (NUS).

The genetic diversity of humans is not only shown in the varied physical appearances of individuals, but also in their different risk levels in developing diseases, as well as their differential responses to treatment. Genetic diversity is the result of human evolution and migration and understanding it allows us to understand our history, and our health.

In the past decade, there has been a revolution in human genetic research, ranging from single gene analysis to systematic genomic studies, leading to the discovery of over 100,000 genetic variants that are related to human diseases and health. Asian populations are often understudied and this, if not remedied, would preclude Asians from enjoying the full benefits of the genetic revolution with its promise of improving health and treatments.

By collaborating with clinician scientists and many research groups in Singapore and Asia, Professor Liu has established an internationally recognised and distinctive research programme on the genetics of Asian populations. His research has not only advanced the biological understanding of diseases that are prevalent in these populations, but he has also discovered Asian biomarkers that have been translated into clinical practice and enabled the prevention of diseases and adverse drug responses (ADRs).

For example, by carrying out systematic studies of leprosy, Professor Liu has revealed the molecular mechanism by which the human immune system regulates and defends against the mycobacteria that are responsible for this infection.

One of the key drugs used for treating leprosy is dapson, and Professor Liu has also discovered that an Asian specific biomarker, HLA-B*1301, is the genetic determinant of Dapsone Hypersensitivity Syndrome (DHS), a deadly ADR associated with its use. This discovery has been successfully translated to the clinical setting with the implementation of HLA-B*1301 testing before dapson is used thereby reducing the risk of DHS.

Professor Liu was part of a team that discovered the specific risk strains of Epstein-Barr Virus (EBV) which are most strongly associated with the development of Nasopharyngeal carcinoma (NPC), a nose cancer that is endemic to South China and Southeast Asia, but very rare in other regions. These EBV risk strains were found to be much more common in NPC endemic regions and were responsible for over 80 per cent of the overall risk for developing NPC. These EBV risk strains can thus be used as biomarkers to identify individuals with high risk for NPC, which will enable early diagnosis and improved survival rates. The discovery also opens up the possibility of preventing NPC by eliminating infection with these EBV risk strains for example, through vaccination.

Professor Liu has also carried out a pioneering study where 5,000 Singaporeans were analysed by whole genome sequencing. This study revealed the genetic architecture and evolutionary history of Asian populations, created the largest genetic bank of Asian populations and piloted technologies and local infrastructure for high-throughput genome sequencing analysis, empowering further genetic studies of Asian populations. This effort was part of the initial phase of the National Precision Medicine programme in Singapore.

Besides leading a competitive research programme on Asian genetics, Professor Liu has also contributed to building technical capabilities and infrastructure for high-throughput genomic analyses in Singapore.

Professor Liu as a leading Asian genetic studies expert has published over 400 papers, including a dozen papers in top medical and scientific journals, such as New England Journal of Medicine, Cell, and Nature Genetics. With over 32,000 citations and a H-index of 81 (Web of Science 2020), Prof Liu’s research is well-cited by the international research community. In recognition of his research excellence in the field, Professor Liu was awarded the “Chen Young Investigator Award” by the Human Genome Organization in 2011 and was named one of “The World’s Most Influential Scientific Minds” by Thomson Reuters in 2015.

YOUNG SCIENTIST AWARDS (YSA)

The YSA recognises young researchers, aged 35 years and below, who are actively engaged in R&D in Singapore, and who have shown great potential to be world-class researchers in their fields of expertise. This award is administered by the Singapore National Academy of Science (SNAS) and supported by the Agency for Science, Technology and Research (A*STAR).

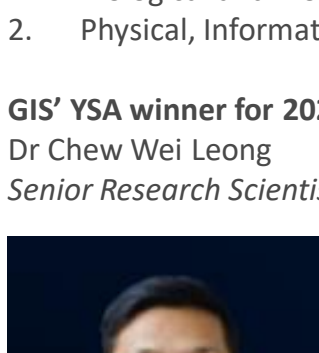
There are two categories of Awards, namely:

1. Biological and Biomedical Sciences; and
2. Physical, Information and Engineering Sciences.

GIS’ YSA winner for 2020

Dr Chew Wei Leong

Senior Research Scientist at GIS



“For his work in gene editing therapy”

Dr Chew Wei Leong invents technologies to make pinpoint changes to genes. His research encompasses novel DNA and RNA-editing modalities (Clustered Regularly Interspaced Short Palindromic Repeats CRISPR-associated systems, also known as CRISPR-Cas1 that include Cas9, Cas12, and Cas13), gene therapy delivery vectors (adeno-associated viruses or AAVs), and synthetic biology.

Dr Chew contributed seminal works to gene editing. He pioneered disease gene correction and gene expression control with CRISPR-Cas9 in the body. These technologies open up therapeutic avenues against multiple diseases, including severe inherited diseases, viral infections, blood disorders, eye diseases, and cancers.

Dr Chew’s team has been building foundational technologies, including new genome-editing systems for precise edits in the human genome, nucleic acid detection and manipulation tools, as well as high-throughput molecular discovery and engineering platforms that generate new CRISPR-Cas proteins and AAV vectors. Importantly, his work is the first to show that CRISPR-Cas is immunogenic within the body and that it is possible to predict and negate such adverse immune reactions. Dr Chew’s research programme innovates in transformative nucleic acid therapeutics that these medicines can be safe and efficacious in the clinic.

Dr Chew and his team have contributed numerous patent applications, inventions, and other intellectual properties in the fields of genome engineering and biotechnology. Some of these have gone on to be licensed to multinational corporations and form the technological foundations for new local startups. Dr Chew’s work has been published in journals such as Science, Nature Methods, Nature Biomedical Engineering, and Nature Communications and shared more broadly as publicly accessible pre-prints on bioRxiv. He is also active in international consortia, bioethics advisory groups, and public outreach. Dr Chew has obtained competitive research funding in the areas of synthetic biology, gene editing, oncology, infectious diseases, and biotechnology.