



PRESS RELEASE

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NUS Medicine researchers develop safer carrier for cancer vaccines

Researchers from the NUS Yong Loo Lin School of Medicine have developed a vaccine carrier that reduces the side effects of vaccination while maintaining the same efficiency levels

Singapore, 02 December 2022 —Lipid nanoparticle (LNP)-based messenger ribonucleic acid (mRNA) vaccines have recently emerged as a promising strategy for the prevention and treatment of cancers, as well as infectious diseases. LNPs are carriers that safely and effectively deliver nucleic acid vaccines, eliciting a strong immune response.

One milestone is the clinical use of leading LNP mRNA vaccines against COVID-19, which exhibits different degrees of protection efficacy, as well as some side effects. As these vaccines are known to be safe, efficient and easily developed, they have been widely used as protection against various human diseases, especially malignant cancers. Despite its high take-up rate in cancer treatment, the common side effects of pain, swelling, and fever, continue to be present, potentially due to inflammatory qualities within the LNPs, that form part of vaccines.

Professor Shawn Chen Xiaoyuan, Nasrat Muzayyin Professor in Medicine and Technology, and Director of the Nanomedicine Translational Research Programme at the Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), and a team of researchers, have developed potent yet low-inflammatory mRNA cancer vaccine vectors—non-harmful vehicles that deliver the DNA instructions into cells, which in turn trigger protective immunity against the cancer cells. Instead of LNPs, they applied polymers as the carrier for cancer mRNA vaccines.

As carriers, these polymers can similarly deliver vaccine antigens, proteins, and drugs to the site of action, with lower inflammatory responses. With similar functions in vaccines, polymers have a larger molecular weight than lipids, and preclinical studies in the paper suggested that the polymers did not show difference in safety levels.

In the study published on [Advanced Materials](#), Prof Chen and his team synthesised a series of alternating copolymers, which can work as vehicles and help mRNA cargos deliver into cells. After entry into cells, mRNA is translated into protein antigens and kill the disease. In the process, the stability of polymeric nanoparticle (PNP) is maintained, which can ensure accurate transmission of all genetic information to the targeted action sites of the antigen to kill the disease. This ensures the efficacy and safety of the vaccine.

Currently, the research team is working on optimising the performance of the polymeric carrier. Its lead structure would be subjected to further studies and clinical translation in the next 18 to 24 months. “This vaccine offers a treatment which could better benefit cancer patients by being potentially potent with low side-effects, and we are hopeful about its efficacy,” said Prof Chen.

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About National University of Singapore (NUS)

The National University of Singapore (NUS) is Singapore’s flagship university, which offers a global approach to education, research and entrepreneurship, with a focus on Asian perspectives and expertise. We have 16 colleges, faculties and schools across three campuses in Singapore, with more than 40,000 students from 100 countries enriching our vibrant and diverse campus community. We have also established our NUS Overseas Colleges programme in more than 15 cities around the world.

Our multidisciplinary and real-world approach to education, research and entrepreneurship enables us to work closely with industry, governments and academia to address crucial and complex issues relevant to Asia and the world. Researchers in our faculties, research centres of excellence, corporate labs and more than 30 university-level research institutes focus on themes that include energy; environmental and urban sustainability; treatment and prevention of diseases; active ageing; advanced materials; risk management and resilience of financial systems; Asian studies; and Smart Nation capabilities such as artificial intelligence, data science, operations research and cybersecurity.

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About the NUS Yong Loo Lin School of Medicine (NUS Medicine)

The NUS Yong Loo Lin School of Medicine is Singapore’s first and largest medical school. Our enduring mission centres on nurturing highly competent, values-driven and inspired healthcare professionals to transform the practice of medicine and improve health around the world.

Through a dynamic and future-oriented five-year curriculum that is inter-disciplinary and inter-professional in nature, our students undergo a holistic learning experience that exposes them to multiple facets of healthcare and prepares them to become visionary leaders and compassionate doctors and nurses of tomorrow. Since the School’s founding in 1905, more than 12,000 graduates have passed through our doors.

In our pursuit of health for all, our strategic research programmes focus on innovative, cutting-edge biomedical research with collaborators around the world to deliver high impact solutions to benefit human lives.

The School is the oldest institution of higher learning in the National University of Singapore and a founding institutional member of the National University Health System. It is one of the leading medical schools in Asia and ranks among the best in the world (Times Higher Education World University Rankings 2023 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2022).

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