

## PRESS RELEASE

### **Red blood cell particles are effective drug carriers in suppressing muscle loss caused by cancer: NUS study**

***A study demonstrated that vesicles released by red blood cells are a viable platform for delivering drugs to increase muscle growth and suppress cancer-associated skeletal muscle weakening and loss.***

Singapore, 24 April 2023—Cancer is a complex systemic disease, with accompanying secondary effects that can result in debilitating effects on the human body. Cancer-associated skeletal muscle weakening or loss, also called “cancer cachexia”, is a prevalent and serious condition responsible for 20-30% of the deaths in affected cancer patients. In current treatments for cancer cachexia, there are limitations in efficacy levels and significant side effects.

A new study led by researchers at the Institute for Digital Medicine (WisDM) and the Department of Pharmacology, Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine), in collaboration with the Chinese Academy of Sciences (CAS), and City University of Hong Kong (CityU), examined a new gene therapy strategy for reversing cancer cachexia. The team used nano-sized particles released by red blood cells, termed “red blood cell-derived extracellular vesicles” (RBCEVs), to package and transport RNA-based drug molecules to muscle cells in the body.

Published in [Molecular Therapy](#), the study found that drug-loaded RBCEVs inhibited target genes could increase muscle growth and suppress cancer cachexia. Compared to the delivery of a single RNA drug, muscle growth was observed to be further enhanced when two RNA drugs targeting two different genes implicated in cancer cachexia were loaded into the same RBCEVs. Importantly, repeated administrations with RBCEVs did not induce toxicity or inflammatory reactions, which is a prerequisite for clinical trials on humans.

“There is a lot of potential in using RNA-based drugs for conditions that are difficult to treat, but the delivery has always been tricky. From our previous and current studies, we have found that the RBCEV delivery platform can help to overcome some of the long-standing technical challenges in the field,” said Assistant Professor Minh Le from WisDM and the Department of Pharmacology at NUS Medicine, who led the study.

Professor Ng Shyh-Chang, Principal Investigator for the State Key Laboratory of Stem Cell and Reproductive Biology at the CAS Institute of Zoology, who co-directed the study, added, “Building on previous target discovery work, this is one of the first studies to leverage RNA therapies to treat cancer cachexia. This could lead to the use EV-based gene therapies to address unmet needs in cachexia and sarcopenia.”

The team has plans for further collaborations to test the use of RBCEV-delivered therapeutics against other targets in the muscles. At the same time, they have been working on applying RBCEVs to the treatment of different cancers, cardiovascular diseases, and COVID-19. Accumulating data from their studies, the RBCEV has shown to be a robust, safe and versatile

platform. As the collective understanding of RBCEV biology and related technologies continue to mature, the RBCEV platform is well-positioned for clinical translation to provide safer and more efficacious treatment options for muscle degenerative conditions as well as other challenging diseases.

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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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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 Asia's leading medical schools 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 2023).

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