

PRESS RELEASE

Efficient Lymphatic Drainage Slows Atherosclerosis Progression

Researchers from NUS Medicine also demonstrated that the regression of atherosclerosis induced by the cholesterol-lowering drug, ezetimibe, was dependent on efficient lymphatic drainage

Singapore, 27 January 2021 — The lymphatic system, one of the body's two major circulatory systems, primarily consists of a network of lymphatic vessels connected to lymph nodes. Lymphatic vessels are a vital but often overlooked component of the cardiovascular system when seen in contrast to blood vessels, and have thus been comparatively neglected by scientists and clinicians. However, research advances in the past decades have begun to uncover the importance of lymphatic vessels in health and diseases.

Lymphatic vessels help to rid the body of toxins, fluid and other waste materials such as lipids from the spaces in tissues. Although lymphatic vessels have been shown to be essential for the drainage of cholesterol from interstitial tissues, their potential role in atherosclerosis, is still largely unknown. Now, researchers led by Associate Professor Veronique Angeli, Director of the Immunology Translational Research Programme, have discovered that efficient lymphatic drainage is an important determinant of atherosclerosis progression.

Atherosclerosis, commonly referred to as the “hardening of the arteries”, is a progressive disease which causes a person's arteries to become narrow and their walls to lose elasticity due to the accumulation of deposits on the inner lining of these blood vessels¹. In patients with this condition, substances such as cholesterol, fats, calcium, and fibrin (clotting factors in the blood) build up into plaque and narrow the openings of the affected arteries. As atherosclerosis worsens, it may lead to the blood vessels becoming so narrow as to decrease blood flow. In time, the plaque could break off, causing a blood clot. If the clot is large enough, it can block blood flow through a coronary artery and cause a heart attack.

Consistent with existing scientific evidence, the team of researchers showed that atherosclerosis is associated with the expansion of the lymphatic vessel network. However, despite the increased number of lymphatic vessels draining the affected artery, lymphatic drainage in the vicinity was compromised. This poor lymphatic drainage resulted in lipids, white blood cells and inflammatory substances accumulating in the arterial wall, aggravating atherosclerosis.

The team also demonstrated that the regression of atherosclerosis induced by the cholesterol-lowering drug, ezetimibe, was dependent on efficient lymphatic drainage. This could point to maximal regression of atherosclerosis happening when circulating atherogenic factors, such as cholesterol and inflammatory mediators, are reduced and efficient aortic lymphatic drainage is promoted.

¹ <https://www.myheart.org.sg/my-heart/heart-conditions/atherosclerosis/>

“These findings are a step forward in understanding a very prevalent disease, showing that atherosclerosis may not only result from increased entry of lipids, white blood cells and other inflammatory factors into the arterial wall, but also from the reduced lymphatic clearance of these factors. Hopefully this knowledge allows clinicians and scientists alike to work towards better diagnosis, treatment and outcomes for patients,” said Assoc Prof Angeli.

“This knowledge suggests that strategies to improve or preserve lymphatic drainage should be considered in conjunction with using existing drugs as treatment options for atherosclerosis, which is a dominant cause of cardiovascular diseases in Singapore and in the rest of the world,” she added.

More details of the paper can be found here: <https://pubmed.ncbi.nlm.nih.gov/33310846/>

The NUS Medicine Immunology Translational Research Programme aims to understand the role of the immune system in health and diseases. The programme strives to enable the discovery and development of more effective immunotherapy, new treatment guidelines and diagnostic tests for patients with disease-specific problems such as autoimmune and airway diseases, cancer, chronic inflammation, infections and organ/ tissue transplantation. These goals are to be achieved by fostering collaborative research and advancing latest technologies to probe immunological mechanisms, and enhancing infrastructure for clinical translation.

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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 17 faculties across three campuses in Singapore, as well as 12 NUS Overseas Colleges across the world. Close to 40,000 students from 100 countries enrich our vibrant and diverse campus community.

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, 31 university-level research institutes, research centres of excellence and corporate labs focus on themes that include energy, environmental and urban sustainability; treatment and prevention of diseases common among Asians; active ageing; advanced materials; as well as risk management and resilience of financial systems. Our latest research focus is on the use of data science, operations research and cybersecurity to support Singapore's Smart Nation initiative.

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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 Asia's leading medical school and ranks among the best in the world (Times Higher Education World University Rankings 2019 by subject and the Quacquarelli Symonds (QS) World University Rankings by Subject 2019).

For more information about NUS Medicine, please visit <https://medicine.nus.edu.sg/>