PRESS RELEASE

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Key to artery health lies in LYVE-1 Macrophage

Singapore, 14 August 2018 — Arteries such as the aorta actively transport oxygenated blood, nutrients and cells throughout the body to keep our tissues functioning normally. Damage to the arteries can result in life-threatening cardiovascular diseases. A major type of damage involves hardening or stiffening of the vessel walls. This phenomenon, known as arterial stiffness, results in raised blood pressure and an increased risk of cardiovascular diseases such as atherosclerosis and aneurysm. However, the causes of arterial stiffness are still largely unknown.

A team of researchers at National University of Singapore's Yong Loo Lin School of Medicine (NUS Medicine), led by Associate Professor Veronique Angeli, has identified a population of cells called macrophages that coat the outer walls of healthy arteries and express a protein called LYVE-1. The researchers found that when these cells were absent, arteries accumulate collagen and lose their elasticity, becoming stiff and inflexible. These findings suggested that the macrophages protect our arteries from becoming stiff, a concept that the team proceeded to prove. They showed that the macrophages interact with another type of cell residing in the artery called smooth muscle cells, which produce collagen. The interaction between the two types of cell reduces production of collagen by the smooth muscle cells.

Assoc Prof Angeli and team showed that the LYVE-1 protein on the macrophages is actually responsible for this protective effect. LYVE-1 binds to a molecule called hyaluronan expressed at the surface of smooth muscle cells and this interaction is required for the degradation of collagen by matrix metalloproteinase 9 (MMP-9).

In summary, this study has unveiled a population of cells associated with blood vessels that protect our arteries from detrimental changes to their structure and function. It also uncovered the novel mechanism by which these macrophages exert their protective effects. The work has clinical implications for both aging and cardiovascular diseases because arterial stiffness is associated with aging and precedes cardiovascular diseases such as atherosclerosis and aneurysm. This knowledge should help in the development of new treatments or the improvement of existing treatments for arterial diseases.

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About the National University of Singapore (NUS)

A leading global university centred in Asia, the National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education and research, with a focus on Asian perspectives and expertise.

NUS has 17 faculties and schools across three campuses. Its transformative education includes a broad-based curriculum underscored by multidisciplinary courses and cross-faculty enrichment. Over 38,000 students from 100 countries enrich the community with their diverse social and cultural perspectives. NUS also strives to create a supportive and innovative environment to promote creative enterprise within its community.

NUS takes an integrated and multidisciplinary approach to research, working with partners from industry, government and academia, to address crucial and complex issues relevant to Asia and the world. Researchers in NUS' Schools and Faculties, 30 university-level research institutes and centres, and Research Centres of Excellence cover a wide range of themes including: energy, environmental and urban sustainability; treatment and prevention of diseases common among Asians; active ageing; advanced materials; risk management and resilience of financial systems. The University's latest research focus is to use data science, operations research and cybersecurity to support Singapore's Smart Nation initiative.

For more information on NUS, please visit www.nus.edu.sg.

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

Established in 1905, the NUS Yong Loo Lin School of Medicine is the first institution of higher learning in Singapore and the genesis of the National University of Singapore.

The School offers one of the finest undergraduate medical programmes in the Asia Pacific region and enjoys international recognition and respect. The Times Higher Education World University Rankings 2018 by subject and Quacquarelli Symonds (QS) World University Rankings by Subject 2017 list NUS Medicine as a leading medical school in Asia.

It admits 300 students to the MBBS degree programme annually and its principal missions are to educate and train the next generation of healthcare professionals, and foster research that will help to advance the practice of medicine.

The 18 NUS Medicine departments in the basic sciences and clinical specialties work closely with the Centre for Medical Education, the Centre for Biomedical Ethics, the Centre for Healthcare Simulation as well as the restructured public hospitals to ensure that teaching and research are aligned and relevant to Singapore's healthcare needs. The School is a founding institutional member of the National University Health System.

For more information about NUS Medicine, please visit http://nusmedicine.nus.edu.sg