MEDIA RELEASE

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A*STAR SCHOLAR MEMBER OF CAMBRIDGE TEAM FIRST TO GROW SMOOTH MUSCLE CELLS FROM PATIENT SKIN CELLS

A*STAR scholar Ms Christine Cheung was first author of a *Nature Biotechnology* paper published this month. The Cambridge team has for the first time, discovered a method of generating different types of vascular smooth muscle cells (SMCs) – the cells which make up the walls of blood vessels - using cells from patients' skin. This work could lead to new treatments and better screening for cardiovascular disease.

Cardiovascular disease is the leading cause of death in the world [1]. It also accounts for one in three deaths each year [2] in Singapore. These deaths are mainly caused by the hardening and subsequent blockage of blood vessels due to the accumulation of fatty materials, a condition called atherosclerosis. As not all patients are suitable for conventional stenting or bypass treatment, an option in the future may be to grow new blood vessels to bypass their own blocked vessels.

The team from the University of Cambridge worked with embryonic stem cells and reprogrammed skin cells, collectively known as human pluripotent stem cells (hPSCs), which have the potential to form any cell type in the body. They discovered a method of creating all the major vascular smooth muscle cells in high purity using hPSCs which can also be easily scaled up for production of clinical-grade SMCs. This is the first time that such a system has been developed and will open the door for comparative studies on different subtypes of SMCs to be carried out, which are otherwise extremely difficult to obtain from patients.

The scientists created three subtypes of SMCs from different embryonic tissues which they reproduced in the culture dish and showed that the various SMC subtypes responded differently when exposed to substances that cause vascular diseases. They concluded that differences in the embryonic origin play a role in their susceptibility to diseases and may play a part in determining where and when common vascular diseases such as aortic aneurysms or atherosclerosis develop.

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[1] http://www.who.int/mediacentre/factsheets/fs317/en/index.html

[2] http://www.myheart.org.sg/heart-facts/statistics/

Dr Alan Colman, Principle Investigator of the Institute of Medical Biology under A*STAR and Executive Director of the Singapore Stem Cell Consortium, said, “This is a major advance in vascular disease modelling using patient-derived stem cells. The development of robust methods to make multiple, distinct smooth muscle subtypes provides tools for scientists to model and understand a greater range of vascular diseases in a culture dish than was previously available. It is a significant stride forward in being able to construct new blood vessels which will benefit a whole range of patients including those with cardiovascular diseases, renal failure and genetic disorders such as Marfans Syndrome that affect the normal function of their blood vessels.”

Dr Lim Khiang Wee, Executive Director of the A*STAR Graduate Academy (A*GA), said, “Christine’s work reflects the calibre of our scholars - they do excellent research and grow into scientists who will contribute to Singapore when they return.”

Ms Christine Cheung is a National Science Scholarship (NSS) scholar and is doing her final year PhD studies at Cambridge University (UK). The NSS scholarship is one of the programmes offered by A*GA, to attract and develop outstanding young talent passionate about research who will spearhead Singapore’s drive to becoming Asian’s Innovation Capital.

Notes for Editor:

1. The paper ‘Generation of human vascular smooth muscle subtypes provides insight into embryological origin–dependent disease susceptibility’ was published on Nature Biotechnology's website on 15 January at 1800 London time / 1300 US Eastern time.

2. The first author of this paper, Ms Christine Cheung, is funded by a National Science Scholarship from the Agency for Science, Technology and Research (Singapore). The other authors are Dr Andreia S Bernardo, Dr Matthew W B Trotter, Prof Roger A Pedersen & Dr Sanjay Sinha (Christine’s PhD supervisor). Additional funding was provided by the Wellcome Trust and the Medical Research Council.

3. The Wellcome Trust is a global charitable foundation dedicated to achieving extraordinary improvements in human and animal health. It supports the brightest minds in biomedical research and the medical humanities. The Trust’s breadth of support includes public engagement, education and the application of research to improve health. It is independent of both political and commercial interests. www.wellcome.ac.uk

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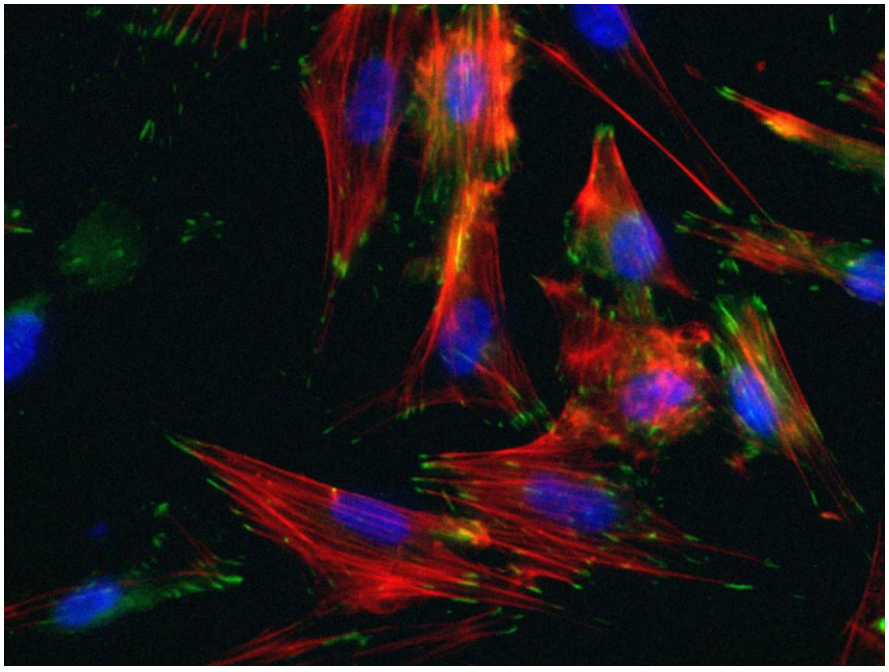
ANNEX A



Credit: Ms Christine Cheung and Dr Sanjay Sinha

This is an image of the smooth muscle cells (SMCs) derived from stem cells by the method developed by the Cambridge team which can be easily scaled up. The SMCs show stress fibers (red) and points of anchorage (green) to the extracellular matrix. Individual cells are marked in blue.