



MEDIA RELEASE

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SINGAPORE SCIENTISTS DISCOVER METABOLIC DRUG CAN TREAT TERMINAL WEIGHT LOSS IN CANCER PATIENTS

Finding by researchers from Genome Institute of Singapore, National Cancer Centre Singapore and Duke-NUS Medical School may help cancer patients suffering from terminal weight loss. The Singapore team is now looking at translating the research to benefit cancer patients worldwide

SINGAPORE – In a world's first, research investigators in Singapore have discovered a metabolic trick to treat the terminal wasting syndrome, or cachexia, which afflicts millions of patients worldwide who suffer from cancer or other chronic diseases. The team found that muscles were burning fat (fatty acid oxidation) too rapidly during cachexia, resulting in fatal muscle loss. The study was published online on 2 May 2016 in *Nature Medicine*.

One of the most lethal effects of cancer is cachexia. It affects approximately 80% of advanced cancer patients. Cachexia patients manifest severe involuntary weight loss due to the rapid, irreversible wasting of muscle mass. It severely reduces a patient's quality of life, diminishes the ability to tolerate cancer treatments like chemotherapy, and increases the risk for secondary illnesses and infections. Cachexia is thought to contribute to approximately 30% of all cancer deaths. However, little is known about how cachexia develops.

Using the latest "Omics" technologies, including genomics and metabolomics, to analyse muscle stem cells afflicted with cachexia, the team identified excessive fatty acid oxidation as the major route by which cachexia develops in patients, thus overturning the long-held assumption that hyper-active fatty acid oxidation is just a by-product of cachexia.

The team has been the first to show that controlling muscle fatty acid oxidation can be used to treat and prevent cancer cachexia. Dr Iain Tan, a medical oncologist at NCCS and a senior author on this study says, "Based on this discovery, we are

already planning our first clinical trials into cachexia, which should start this year.” The team had demonstrated the use of a fatty acid oxidation inhibitor drug in treating muscle wasting during cachexia, and is looking towards translating this research to benefit cancer patients worldwide.

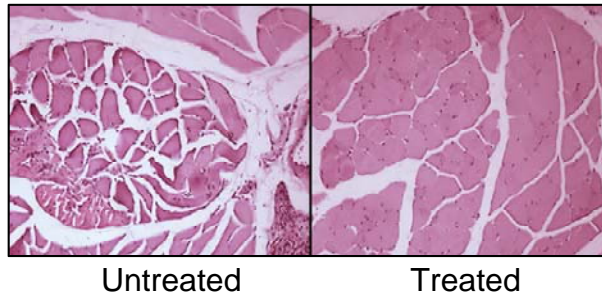
This work was spearheaded by Dr Ng Shyh-Chang at A*STAR’s Genome Institute of Singapore (GIS), in close collaboration with Dr Teh Bin Tean and Dr Iain Tan, clinician-scientists at the National Cancer Centre Singapore (NCCS), Duke-NUS Medical School (Duke-NUS) and GIS. Dr Ng Shyh-Chang said, “The strong capabilities built up at GIS and BTI have enabled us to rapidly crack this long-standing, unsolved problem for cancer patients. We are looking forward to treating cancer patients with this drug.”

It was a national effort involving researchers from A*STAR, Duke-NUS, NCCS and cancer surgeons from the National University Hospital and the Singapore General Hospital. Prof Teh Bin Tean, a senior author on the study and Deputy Director (Research) of NCCS emphasised that “This is a great example of how different institutions across the country come together harnessing their expertise and resources to solve an important medical problem. We all look forward to more fruits of such efforts.”

Prof Ng Huck Hui, Executive Director of GIS, said, “Over the past few years, our collaborations with the industry and clinical community have increased greatly in both numbers and impact. These collaborations have proven time and time again that the whole is definitely greater than the sum of its parts – greater outcomes for human health are achieved when we pull our resources and expertise together.”

Prof Soo Khee Chee, Director of NCCS, said, “This finding constitutes a critical step in understanding and treating a major health problem for cancer patients worldwide.”

IMAGE



Caption: Treatment of muscles during cancer cachexia. Left: Image of muscles undergoing atrophy during cancer cachexia, without treatment. Right: Image of muscles rescued from atrophy during cancer cachexia, after treatment with a drug that blocks fatty acid oxidation.

Notes to Editor:

The research findings described in this media release can be found in the scientific journal *Nature Medicine*, under the title, “Excessive fatty acid oxidation induces muscle atrophy in cancer cachexia” by Tomoya Fukawa¹⁻³, Benjamin Chua Yan-Jiang⁴, Jason Chua Min-Wen⁴, Elwin Tan Jun-Hao⁴, Dan Huang², Chao-Nan Qian⁵, Pauline Ong^{1,2}, Zhimei Li², Shuwen Chen⁶, Shi Ya Mak⁶, Wan Jun Lim⁷, Hiro-omi Kanayama³, Rosmin Elsa Mohan⁸, Ruiqi Rachel Wang⁸, Jiunn Heng Lai⁹, Clarinda Chua^{4,7}, Hock Soo Ong¹⁰, Ker-Kan Tan¹¹, Ying Swan Ho⁶, Iain Beehuat Tan^{4,7,12}, Bin Tean Teh^{1,2,7,13-15} & Ng Shyh-Chang⁴

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About A*STAR's Genome Institute of Singapore (GIS)

The Genome Institute of Singapore (GIS) is an institute of the Agency for Science, Technology and Research (A*STAR). It has a global vision that seeks to use genomic sciences to achieve extraordinary improvements in human health and public prosperity. Established in 2000 as a centre for genomic discovery, the GIS will pursue the integration of technology, genetics and biology towards academic, economic and societal impact.

The key research areas at the GIS include Human Genetics, Infectious Diseases, Cancer Therapeutics and Stratified Oncology, Stem Cell and Regenerative Biology, Cancer Stem Cell Biology, Computational and Systems Biology, and Translational Research.

The genomics infrastructure at the GIS is utilised to train new scientific talent, to function as a bridge for academic and industrial research, and to explore scientific questions of high impact.

For more information about GIS, please visit www.gis.a-star.edu.sg

About National Cancer Centre Singapore (NCCS)

National Cancer Centre Singapore provides a holistic and multi-disciplinary approach to cancer treatment and patient care. We treat almost 70 per cent of the public sector oncology cases, and they are benefiting from the sub-specialisation of our clinical oncologists. NCCS is also accredited by the US-based Joint Commission International for its quality patient care and safety.

To deliver among the best in cancer treatment and care, our clinicians work closely with our scientists who conduct robust cutting-edge clinical and translational research programmes which are internationally recognised. NCCS strives to be a global leading cancer centre, and shares its expertise and knowledge by offering training to local and overseas medical professionals. www.nccs.com.sg

About Duke-NUS Medical School

The Duke-NUS Medical School (Duke-NUS) was established in 2005 as a strategic collaboration between the Duke University School of Medicine, located in North Carolina, USA, and the National University of Singapore (NUS). Duke-NUS offers a graduate-entry, 4-year MD (Doctor of Medicine) training programme based on the unique Duke model of education, with one year dedicated to independent study and research projects of a basic science or clinical nature. Duke-NUS also offers MD/PhD and PhD programmes. Duke-NUS has five Signature Research Programmes: Cancer and Stem Cell Biology, Neuroscience and Behavioural Disorders, Emerging Infectious Diseases, Cardiovascular and Metabolic Disorders, and Health Services and Systems Research.

Duke-NUS and SingHealth have established a strategic partnership in academic medicine that will guide and promote the future of medicine, tapping on and combining the collective strengths of SingHealth's clinical expertise and Duke-NUS' biomedical sciences research and medical education capabilities.

For more information, please visit www.duke-nus.edu.sg

About the Agency for Science, Technology and Research (A*STAR)

The Agency for Science, Technology and Research (A*STAR) is Singapore's lead public sector agency that spearheads economic oriented research to advance scientific discovery and develop innovative technology. Through open innovation, we collaborate with our partners in both the public and private sectors to benefit society.

As a Science and Technology Organisation, A*STAR bridges the gap between academia and industry. Our research creates economic growth and jobs for Singapore, and enhances lives by contributing to societal benefits such as improving outcomes in healthcare, urban living, and sustainability.

We play a key role in nurturing and developing a diversity of talent and leaders in our Agency and Research Institutes, the wider research community and industry. A*STAR oversees 18 biomedical sciences and physical sciences and engineering research entities primarily located in Biopolis and Fusionopolis.

For more information on A*STAR, please visit www.a-star.edu.sg