

**MEDIA RELEASE
FOR IMMEDIATE RELEASE**

28 SEPTEMBER 2017

**SINGAPORE SCIENTISTS DEVELOP NEW DNA TECHNOLOGY TO DETECT
BREAST CANCER RELAPSE**

Research uncovers unique tumour DNA found in blood which can be detected with a simple blood test for numerous clinical applications

Singapore – Researchers in Singapore, together with international collaborators from Denmark and USA, have successfully identified a unique biomarker¹ that is strongly associated with breast cancer relapse. This finding has led to the development of a simple blood test which has numerous clinical applications, such as detecting relapse early and testing treatment efficacy. The study was recently published in scientific journal *Nature Medicine* in September 2017.

Jointly led by A*STAR's Genome Institute of Singapore (GIS), Tan Tock Seng Hospital (TTSH) and National University Health System (NUHS), the research utilised an integrative genomic approach to analyse tumour samples from breast cancer patients, which led to the identification of this biomarker. The identified biomarker was found in more than 70% of recurrent tumours, taken from breast cancer patients who suffered relapse of the disease. In addition, the study shows that early stage patients whose tumours tested positive for this biomarker at the time of diagnosis are nearly 40 times more likely to develop a relapse within 5 years than patients whose tumours tested negative. The finding prompted GIS Innovation Fellow Dr Goh Jian Yuan and his colleagues to develop a blood-based diagnostic test kit to detect tumour DNA in the blood.

“Tumour relapse remains the main reason for breast cancer mortality. However, there are unmet clinical demands for new technology to monitor patients or treatment to prevent disease relapse. The blood test we developed based on this finding can be potentially used to monitor tumour progression after treatment so that doctors can make early decisions on other forms of therapy,” explained the study's lead author Prof Yu Qiang, Senior Group Leader, Cancer Therapeutics & Stratified Oncology at GIS. “A finding like this has strong clinical potential; it warrants further prospective clinical validations and future commercial development,” he added.

Co-senior author Dr Tan Ern Yu, senior consultant and breast surgeon at TTSH, commented, “Due to limited sensitivity and specificity, available tumour markers for breast cancer are not routinely used. This blood-based DNA test has the potential to

¹A biomarker is anything that can be used as an indicator of a particular disease state or some other physiological state of an organism. In medicine, a biomarker is a measurable indicator of the severity or presence of some disease state.

be routinely used as the primary model for monitoring treatment response in breast cancer patients.”

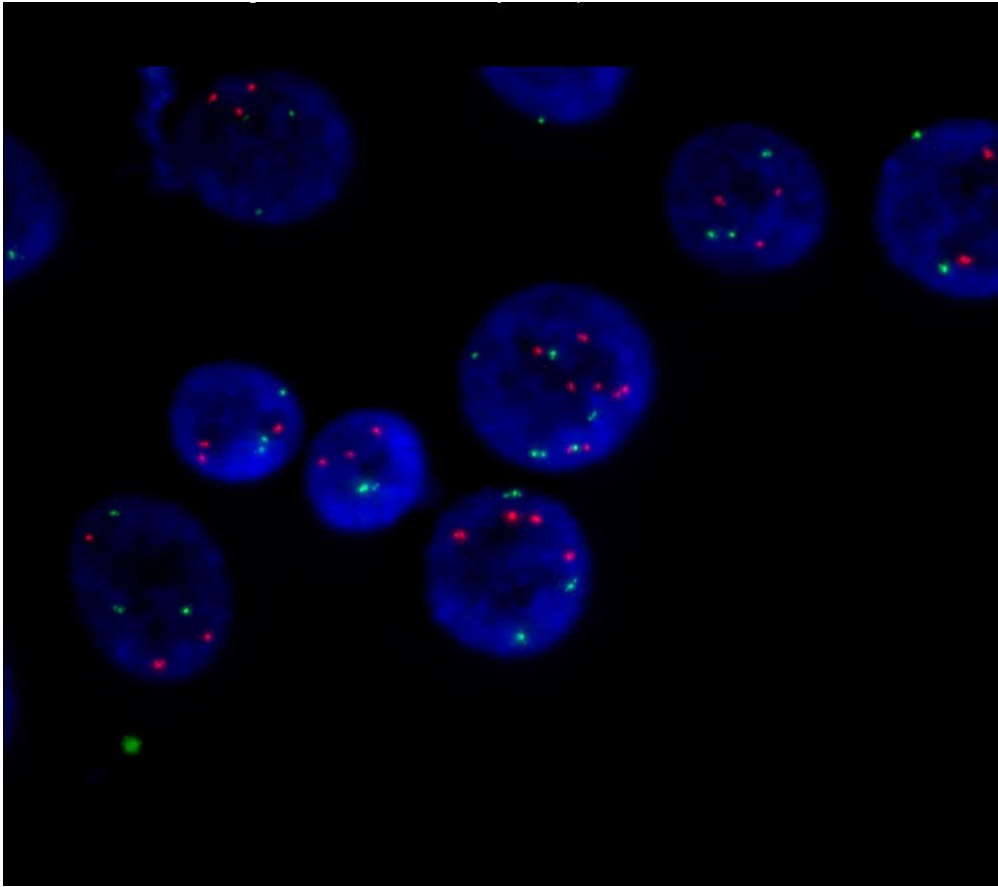
“Our studies have shown that drugs that inhibit a therapeutic target, called IRAK1, can be used to treat tumours that test positive for the biomarker. Given the promising efficacy of IRAK1 inhibitors in our pre-clinical studies, this class of drugs may potentially be tested in clinical trials in breast cancer patients whose tumours test positive for the biomarker,” said co-senior author, A/Prof Lee Soo Chin, Head and Senior Consultant, Department of Haematology-Oncology, National University Cancer Institute, Singapore, which is a member of the NUHS.

Executive Director of GIS, Prof Ng Huck Hui said, “GIS has been working with the clinical community to develop various liquid biopsy technologies. Liquid biopsy has been steadily gaining traction in the last few years and many studies have illustrated its potential application and advantages in individualised medicine and oncology management. A non-invasive alternative to tissue biopsy, it might also help clinicians make more informed decisions for treatment regimens. The team at GIS is committed to developing and commercialising the blood test with industry partners so that it can be adopted in clinics quickly to benefit breast cancer patients.”

Breast cancer is the most common cancer in women worldwide. It is estimated that over 508,000 women died in 2011 due to breast cancer².

²World Health Organization <http://www.who.int/cancer/detection/breastcancer/en/index1.html>

Image



(Image source: A*STAR's Genome Institute of Singapore)

High number of the identified DNA biomarker (red) can be found in the nucleus (blue) of aggressive breast cancer tumour cells.

Notes to Editor:

The research findings described in this media release can be found in the scientific journal *Nature Medicine*, under the title, "*Chromosome 1q21.3 amplification is a trackable biomarker and actionable target for breast cancer recurrence*" by Jian Yuan Goh^{1,14}, Min Feng^{1,14}, Wenyu Wang^{1,14}, Gokce Oguz^{1,2}, Siti Maryam J M Yatim¹, Puay Leng Lee¹, Yi Bao¹, Tse Hui Lim³, Panpan Wang⁴, Wai Leong Tam^{1,5}, Annette R Kodahl⁶, Maria B Lyng⁷, Suman Sarma¹, Selena Y Lin⁸, Alexander Lezhava¹, Yoon Sim Yap⁹, Alvin S T Lim³, Dave S B Hoon⁸, Henrik J Ditzel^{6,7}, Soo Chin Lee^{5,10}, Ern Yu Tan^{11,12} & Qiang Yu^{1,2,4,13}

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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 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

About Tan Tock Seng Hospital (TTSH)

TTSH is one of Singapore's largest multi-disciplinary hospitals with 173 years of pioneering medical care and development. The hospital has 45 clinical, allied health and pharmacy departments as well as 16 specialist centres. It also has three institutes that are spearheading care, research and innovations in geriatric medicine, infectious diseases and ophthalmology. Powered by more than 8,000 healthcare staff, TTSH sees over 2,500 patients at its specialist clinics and some 460 patients at its emergency department every day. TTSH is part of the National Healthcare Group, providing holistic and integrated patient care.

With a strong quality culture steeped in patient safety, TTSH constantly challenges itself to provide faster, better, cheaper and safer care for patients. To achieve this, the hospital keeps abreast and believes in investing in its staff, facilities, medical technology and system improvements. In recognition of its commitment to excellent patient care and its comprehensive range of quality healthcare services, TTSH has been awarded the ISO 14001 and OHSAS 18001 certification as well as the prestigious Joint Commission International (JCI) accreditation.

About the National University Health System (NUHS)

The National University Health System (NUHS) is an integrated Academic Health System and Regional Health System in Singapore that delivers value-driven, innovative and sustainable healthcare.

Institutions in the NUHS group include four hospitals - National University Hospital, Ng Teng Fong General Hospital, Jurong Community Hospital and Alexandra Hospital (in 2018); three National Specialty Centres - National University Cancer Institute, Singapore (NCIS), National University Heart Centre, Singapore (NUHCS) and National University Centre for Oral Health, Singapore (NUCOHS); a polyclinic group - the National University Polyclinics (NUP); one medical centre – Jurong Medical Centre; and three academic health sciences institutions – NUS Yong Loo Lin School of Medicine (including the Alice Lee Centre for Nursing Studies), NUS Faculty of Dentistry and NUS Saw Swee Hock School of Public Health.

With member institutions under a common governance structure, NUHS creates synergies for the advancement of health by integrating patient care, health science education and biomedical research.

As a Regional Health System, NUHS works closely with health and social care partners in the public, private and people sectors to develop and implement programmes that contribute to a healthy and engaged population in the Western part of Singapore.

For more information, please visit www.nuhs.edu.sg