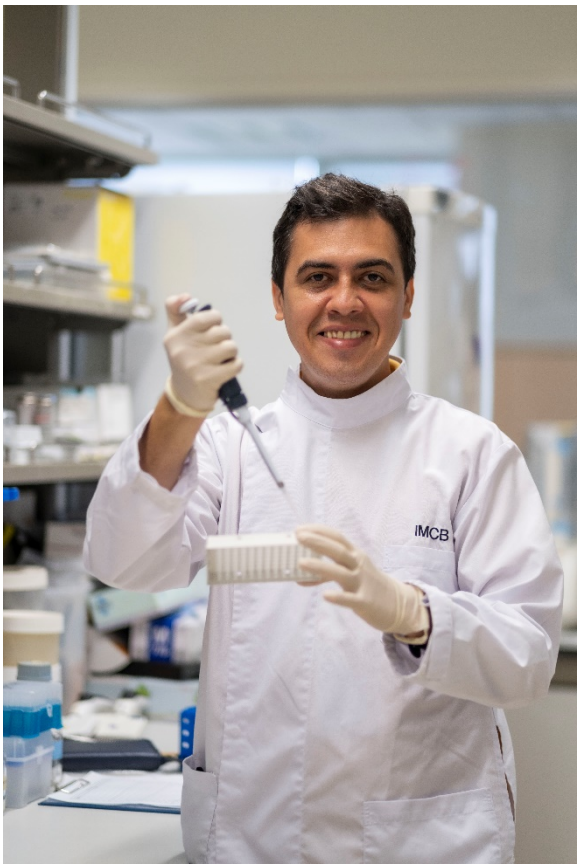
Institute of Molecular and Cell Biology
IMCB

PRESS RELEASE

20 JULY 2022

NEW DISCOVERY IN CANCER PROGRESSION PAVES WAY TO COMBAT CANCER

Singapore scientists have identified an important novel mechanism in cancer cells that could enable more targeted treatment for cancer.



*Semih Akincilar, Senior Research Fellow at A*STAR's Institute of Molecular and Cell Biology and lead researcher of the study, performing gene expression analysis. Image credit: Dorcas Hei, A*STAR's Institute of Molecular and Cell Biology (IMCB)*

SINGAPORE – Scientists from A*STAR's Institute of Molecular and Cell Biology (IMCB) and Genome Institute of Singapore (GIS), as well as the NUS Cancer Science Institute of Singapore (CSI Singapore), National Cancer Centre Singapore (NCCS) and Nanyang Technological University (NTU), have identified an important cancer progression mechanism that is observed in 90 per cent of cancer cells. This discovery will guide further development of cancer specific drugs with potentially fewer side effects. The research, led by IMCB, was published in leading scientific journal Nucleic Acid Research on 14 June 2022.

The life span of a normal healthy cell is determined by telomeres, protective caps at the ends of chromosomes. Each time a cell divides, the telomeres become shorter until eventually, they are too short to protect the DNA and the cell dies naturally. In contrast, cancer cells live through reactivating telomerase, an enzyme which can prolong telomeres, but is inactive in most adult cells.

By activating the Human Telomerase Reverse Transcriptase (hTERT) gene, cancer cells can continue to divide and multiply indefinitely in the body.

Studies have shown that telomerase is reactivated in as much as 90 per cent of cancers, making hTERT, through which telomerase is activated, an excellent candidate for targeting cancer cells.

Current efforts to treat cancer by inhibiting telomerase with drugs have proven to be too toxic to patients due to the stong side effects on healthy cells. The research team has identified a specific DNA structure that forms only in cancer cells and brings the necessary molecular machinery into the correct position to activate the hTERT gene. The detailed mechanism of hTERT activation provided in this study would be instrumental in designing drugs to inhibit hTERT specifically in cancer cells with less side effects.

“Activation of telomerase is the most common oncogenic event providing immortality to cancer cells. We now know how to inhibit telomerase activity to target cancer cells specifically. This study will be a guide for developing next-generation cancer inhibitors,” said Semih Akincilar, Senior Research Fellow at A*STAR’s IMCB and lead researcher of the study.

Patient-derived colorectal cancer cell lines generated by GIS were utilised to identify correlative gene expression for hTERT activation and ascertain the physiological relevance of the findings in this study. These models will serve as a testbed for future studies aimed at the development of cancer-specific inhibitors of telomerase.

Building on this work, the team will collaborate with industrial and clinical partners to develop cancer-specific telomerase inhibitors and bring those candidates to the clinical stage.

– END –

Enclosed:

ANNEX A – Notes to Editor on Research Findings

For media queries and clarifications, please contact:

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About A*STAR's Institute of Molecular and Cell Biology (IMCB)

The vision of Institute of Molecular and Cell Biology (IMCB) is to be a premier cell and molecular biology institute which addresses the mechanistic basis of human diseases and its mission is to conduct cutting-edge discovery research in disease pathways; to groom early career researchers to be future leaders in research; and to collaborate with the public sector, medical and industry communities for research impact. IMCB plays an important role training and recruiting scientific talents, and has contributed to the development of other research entities in Singapore. Its success in fostering a biomedical research culture in Singapore has catalysed Singapore's transformation into an international hub for biomedical research, development and innovation.

Funded by A*STAR, IMCB's use-inspired research comprises 4 major programmes: Neurometabolism in Health and Diseases; Cancer Signalling and Therapies; Cell Biology and Therapies; and Innovative Technologies. IMCB also has two semi-autonomous programmes, the Disease Intervention Technology Laboratory (DITL), and the Molecular Engineering Laboratory (MEL). IMCB's technologies and platforms focus on Mouse Models of Diseases, Molecular Histopathology, Cellular Microscopy, and Proteomics & Metabolomics. For more information about IMCB, please visit www.a-star.edu.sg/imcb.

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ANNEX A – NOTES TO EDITOR

The research findings described in this media release can be found in *Nucleic Acid Researc*h, under the title, "Identification of mechanism of cancer-cell-specific reactivation of hTERT offers therapeutic opportunities for blocking telomerase specifically in human colorectal cancer", published on 14 June 2022.