Scientists from A*STAR’s Institute of Medical Biology (IMB) have discovered gastric cancer is driven by Lgr5-expressing chief cells, a discovery that represents a significant breakthrough in the study of cancer biology, and delivers crucial insight into gastric cancer development that should prove invaluable for developing more effective treatments in the clinic.

According to the World Health Organization, gastric cancer is the fourth leading cause of cancer globally.1 In Singapore, gastric cancer is among the top 10 most common cancers for males and females.2 The most common cause is infection by the bacterium Helicobacter pylori (H. pylori), which accounts for more than 60% of cases. Certain types of H. pylori have greater risks than others.

Due to constant exposure to mechanical stress (such as abrasion or inflammation) and hostile contents (for example, microbes and alcohol) within the stomach lumen, highly specialised cell types must be constantly replaced to maintain a functional stomach. Adult stem cells are believed to fuel the process of repetitive tissue renewal. Expression of a particular gene – Lgr5 – is specific to adult stem cells of multiple organs. Identification of this stem cell label has driven major advances in the understanding of stem cell biology for clinical applications.

The two and half year research project was led by Dr Marc Leushacke, Research Scientist at IMB, under the tutelage of Professor Nick Barker, Research Director. The team discovered a new population of Lgr5-labeled cells within the lining of the major digestive region of the stomach, known as the body or corpus and characterised the role of these Lgr5-labeled cells during adult homeostasis, injury repair and cancer. They found that Lgr5-expressing cells do not behave as corpus stem cells during homeostasis, but are recruited to function as stem cells to effect epithelial renewal following injury. These reserve stem cells are further defined as a major source of gastric cancer following mutation. These findings reveal clinically

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1 http://www.who.int/mediacentre/factsheets/fs297/en/
relevant insights into homeostasis, repair and cancer in the body. The research was partly funded by the Singapore Gastric Cancer Consortium.

Professor Barker said, “The origin of gastric cancer is controversially discussed in the field. Our study definitively identifies Lgr5-labeled corpus cells at the gland base as a major gastric cancer origin and therefore provides clarity to the ongoing discussion. We hope that these findings will contribute to translatable clinical outcomes in the future.”


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**About A*STAR’s Institute of Medical Biology (IMB)**

IMB is one of the Biomedical Sciences Institutes of the Agency for Science, Technology and Research (A*STAR). It was formed in 2007, with a mission to study mechanisms of human disease in order to discover new and effective therapeutic strategies for improved quality of life.

IMB has 20 research teams working in three primary focus areas - stem cells, genetic disease, and skin biology. The teams work closely with clinical collaborators as well as industry partners, to target the challenging interface between basic science and clinical medicine. IMB’s strategic research topics are targeted at translational research to understand the mechanisms of human disease so as to identify new strategies for disease amelioration, cure and eradication and to improve health and wellbeing. Since 2011, IMB has also hosted the inter-research institute Skin Biology Cluster platform, and leads major strategic funding programs in rare genetic diseases and in skin biology. In 2013 IMB became a founding institute of the Skin Research Institute of Singapore.

For more information about IMB, please visit [www.imb.a-star.edu.sg](http://www.imb.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.

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