

Key discovery points way to detecting stomach cancer early

Local team's feat may help identify those at very high risk, improve resource allocation

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A recent breakthrough discovery by local researchers will soon help with the early detection of stomach cancer.

Researchers from Duke-NUS Medical School, National University Hospital (NUH), and the National University of Singapore's Yong Loo Lin School of Medicine discovered that changes in the mucous lining of the stomach in patients with chronic gastritis or acid reflux could possibly be an early indication of stomach cancer.

Patients with this condition, called intestinal metaplasia, face a six-time increased risk of developing stomach cancer.

The findings – published in peer-reviewed scientific journal *Cancer Cell* in November – mean doctors will be able to use genetic tests, including simple and inexpensive blood tests, to identify people who are at a very high risk of getting stomach cancer.

“We can divide people into groups based on their risk to help save resources by making sure they get the right tests and care they need,” said Professor Yeoh Khay Guan, lead principal investigator of the Singapore Gastric Cancer Consortium (SGCC) and senior consultant in the division of gastroenterology and hepatology at NUH.

Stomach cancer claims between 300 and 500 lives every year in Singapore.

The disease is troubling because it rarely shows symptoms in the early stages, when patients experience no or mild symptoms, making it one of the hardest cancers to predict early. Two-thirds of stomach cancer patients are diagnosed only when it is at an advanced stage.

The study – started in 2007 with pre-cancerous patients – looked at over 1,100 tissue samples using powerful technologies for researchers to study genetic material one cell at a time and see where specific genes are being expressed within tissues or organs.

It also provided insight into the communication between cells in their actual location within the tissue.

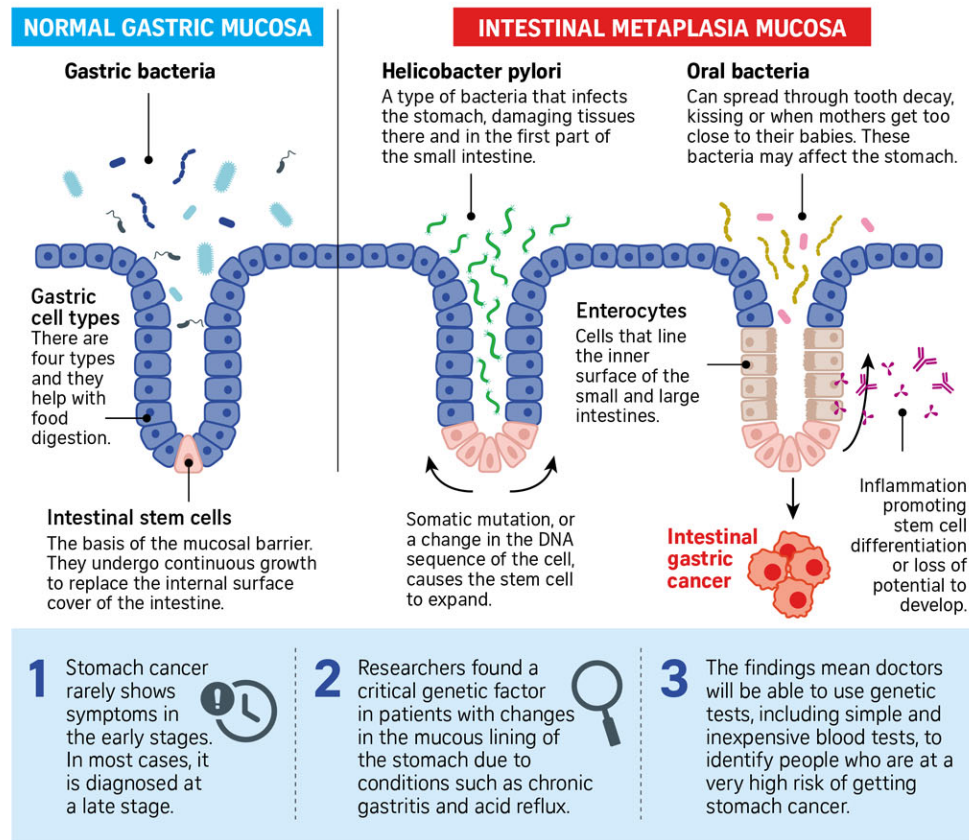
Professor Patrick Tan, senior vice-dean for research at Duke-NUS, said a cancer is made up of not only cancerous cells, but also normal cells, immune cells and blood vessels.

In the past, to study the cancer, “we would mash everything up, grind it up in a blender and analyse or measure it at the level of its molecules as a whole”, said Prof Tan, who is also with the school's cancer and stem cell biology programme.

Using a pizza as an analogy to explain the breakthrough discovery, he said: “With the ‘mashed-up pizza’, we could tell the amount of car-

Signalling risk

Here's a look at how the mucous lining of the stomach in patients with chronic gastritis or acid reflux can change.



Source: CANCER CELL (2023) STRAITS TIMES GRAPHICS



Members of the research team (from far left): Professor Jimmy So, Dr Roxanne Chong, Dr Huang Kie Kyon, Professor Patrick Tan and Professor Yeoh Khay Guan. Their findings were published in peer-reviewed scientific journal *Cancer Cell* in November.
ST PHOTO: HESTER TAN

bohydrate or protein (in it). Looking at the data of each single cell, we will be able to dissect the specific contributions of each ingredient.”

He added: “This particular work allows us to see the small populations (of cells) we would otherwise miss when we grind everything up. We also see a smaller sub-population of cells. Their molecular profile looks similar to gastric cancer cells and we believe these are the true culprits lurking underneath the mash that we never used to see. They represent the true origin of (gastric) cancer.”

The study was supported by SGCC, a national translational research group comprising clinicians and scientists working in stomach cancer research.

Prof Yeoh said cells and tissue samples for this latest genomic study were provided by a cohort of pre-cancerous patients under the gastric cancer epidemiology programme (GCEP).

One GCEP patient is administrative executive Angela Tan, 66. She was referred to NUH after being diagnosed with acid reflux due to bacterial infection of the stomach at a polyclinic. “As part of the programme, I am monitored regularly. I get checked every two years and at least I know early if I were to develop cancer,” she said.

Prof Yeoh added that GCEP has helped the doctors understand how gastric cancer develops – why some people get stomach cancer and others do not.

SGCC was given the first Translational and Clinical Research Flagship Research Grant in 2007 by the National Research Foundation (NRF). This was renewed for five years from 2013 to 2018.

In 2019, SGCC was further given the Open Fund-Large Collaborative Grant by the National Medical Research Council and NRF for 2019 to 2024. The current study was funded by this grant.

The total amount it receives under the grant is \$25 million.

The study's co-senior author, Professor Jimmy So, who heads the division of general surgery at NUH, said: “With this molecular road map of disease progression, we can now explore more targeted surveillance for patients at higher risk, as well as the anti-inflammatory or antibiotic agents to intercept them before they evolve into cancer. This will potentially lead to improved patient outcomes through early detection.”

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