

Team identifies mutations that may enable earlier diagnosis of colorectal cancer recurrence

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A multi-disciplinary team of doctors and scientists from Singapore has characterised the genetic changes associated with the spread of colorectal cancer to the liver. This finding is significant in helping to develop personalised diagnostic tests for patients with colorectal cancer based on the genetic changes present in each individual's colon tumour. The research team comprises representatives from National Cancer Centre Singapore (NCCS), Singapore General Hospital (SGH), Duke-NUS Graduate Medical School (Duke-NUS), A*STAR's Genome Institute of Singapore (GIS) and Cancer Science Institute Singapore (CSI Singapore) of the National University of Singapore (NUS). The findings were published online in *Genome Biology*.

Colorectal [cancer](#) is Singapore's most common cancer and incidence rates continue to rise. Most patients are initially diagnosed with an early stage disease. However, a proportion of these patients will develop a recurrence of the cancer (metastasis), typically in the liver, one to three years after their colon surgery. If identified early, the [liver metastasis](#) may be amenable to surgical removal, and cure may still be possible.

The Singapore team used leading edge DNA sequencing tools, some of which were developed in-house, including specialised laboratory techniques and computational methods developed at Duke-NUS and GIS to characterise genetic alterations associated with the spread of [colorectal cancer](#) to the liver.

Out of 750 genes measured, they found that every individual's cancer had a unique set of about 15 key genetic mutations. Whilst there was little overlap in the specific mutations present between 2 different patients, the large majority of the mutations found in each patient's colon tumour were identical to the mutations present in the same patient's liver metastasis. The team seeks to exploit this biological finding to develop new diagnostic tests in the search and identification of early spread of the cancer based on the genetic information found in the removed cancer from the [colon surgery](#) in the first instance.

Cancer survivors dread having their cancer recur. Even if this happens, we still have a chance to cure our colorectal cancer patients provided we diagnose it early. The research findings can have a significant impact on our [patients'](#) quality of life, and improve the precision of the treatment they receive," said co-author of the study, Assoc Prof Tang Choong Leong, Head, Department of Colorectal Surgery at SGH.

"Based on this study, we intend to customise a diagnostic test for each colorectal cancer individual. We will use the unique set of mutations present in that individual's cancer, as a barcode or thumbprint that we can exploit as innovative diagnostics to monitor for cancer recurrence and diagnose it early", explained Dr Iain Tan, co-lead author of the study who is a Consultant Medical Oncologist at NCCS and also a clinician scientist at GIS. The team has been awarded a grant from the National Medical Research Council (NMRC) to further develop this diagnostic test. Dr Tan cautioned that this R&D effort will take several years although he is optimistic that with this finding, further progress could be realised.

This study was performed in partnership with the POLARIS program, a strategic national program funded by A*STAR to translate local research findings towards "fit-for purpose" applications that improve the diagnosis and treatment of diseases in Singapore.

"POLARIS continues to seek opportunities to work with leading local researchers to enable the transition of their research findings from bench to bedside", explained Prof Patrick Tan from Duke-NUS who is a co-lead author of the study and the Program Director of POLARIS.

Provided by SingHealth

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