

Assay for genetic quirk can provide a wealth of information on patient disease status and prognosis

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Despite great advances in medicine, cancer remains a death sentence for many. "Patients are still dying from breast cancer relapse," says Jian Yuan Goh, of A*STAR's Genome Institute of Singapore. The researcher and his colleagues, a team from Singapore, China, the United States, and Denmark, have recently identified a genetic aberration in a particularly aggressive subtype of breast cancer cells that, when quantified, can provide insights into a patient's cancer status, chances of relapse, and treatment progress. This discovery paves the way for an alternative to invasive and expensive biopsy testing.

One model of how cancer proliferates involves the presence of chemotherapy-resistant tumor-initiating cells (TICs). "Even after chemotherapy and surgery, these cells can survive, regrow, and cause recurrence," says Goh. The team, led by A*STAR's Qiang Yu, found that TICs possess an abnormally high number of copies of a specific section of DNA. This 'copy number amplification' results in an overproduction of the proteins coded for by that section of genetic material.

Goh and his colleagues have produced a 'liquid biopsy' assay that detects this genetic quirk within circulating fragments of tumor DNA found in blood. A presence of TIC-linked DNA allows clinicians to inform patients of the increased risk of [breast cancer](#) recurrence, as well as monitor the progress of treatment and the emergence of tumor resistance

to therapy, based on the changing levels of the biomarker. The researchers also found the amplification to be correlated to [cancer metastasis](#).

TIC presence might signal a bleak prognosis for patients if it didn't also offer a unique avenue of treatment. With an abnormally high number of a specific set of genes, TICs overproduce the S100A family of proteins. As these proteins provide TICs with their chemo-resistant properties, the researchers are now investigating pharmacological interventions that might block this pathway and provide a lifeline in otherwise incurable cases of breast cancer. "We're in discussions to start a clinical trial with the drug pacritinib, using our biomarker to guide treatment," explains Goh. "Pacritinib is not yet approved for use in breast cancer, so we first need to see whether tumors respond to this treatment."

"What we're trying to do is provide a cost-effective way for clinicians to track [breast cancer recurrence](#). The alternative—genetic sequencing—is comprehensive, but very expensive. You can't imagine a patient coming in every month to be sequenced for 3,000 dollars, but, if we develop this assay, testing will be a lot more affordable," says Goh.

More information: Jian Yuan Goh et al. Chromosome 1q21.3 amplification is a trackable biomarker and actionable target for breast cancer recurrence, *Nature Medicine* (2017). [DOI: 10.1038/nm.4405](https://doi.org/10.1038/nm.4405)

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