

DRUG & DISEASES

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E-LEARNING (<http://elearning.mims.com/Singapore/page.jsp?p=Home>)



Home

News

Special Reports

[\(/Singapore/channel/Pharmacy/home\)](http://Singapore/channel/Pharmacy/home) [\(/Singapore/channel/Pharmacy/group/News\)](http://Singapore/channel/Pharmacy/group/News)

[\(/Singapore/channel/Pharmacy/group/Special-Reports\)](http://Singapore/channel/Pharmacy/group/Special-Reports)

Case Studies

[\(/Singapore/channel/Pharmacy/group/Case-Studies\)](http://Singapore/channel/Pharmacy/group/Case-Studies)

Clinical Review

[\(/Singapore/channel/Pharmacy/group/Clinical-Review\)](http://Singapore/channel/Pharmacy/group/Clinical-Review)

Practice Insights

[\(/Singapore/channel/Pharmacy/group/Practice-Insights\)](http://Singapore/channel/Pharmacy/group/Practice-Insights)

Drug Updates

[\(/Singapore/channel/Pharmacy/group/Drug-Updates\)](http://Singapore/channel/Pharmacy/group/Drug-Updates) [\(/Singapore/channel/Pharmacy/group/Patient-Resources\)](http://Singapore/channel/Pharmacy/group/Patient-Resources)

Patient Resources

Rapid CTC cultures may predict survival, treatment in cancer

15 Jan 2016, Radha Chitale



Dr. Khoo Bee Luan, NUS PhD graduate (left) and Professor Lim Chwee Teck, Principal Investigator, Mechanobiology Institute, Singapore, were part of the NUS team that developed a CTC culturing technique that could help predict treatment outcome and monitor disease status. Photo courtesy of the National University of Singapore.

A new method for culturing circulating tumour cells (CTCs) in vitro from blood samples could reduce the time necessary to determine the most effective therapy as well as help doctors predict patient outcomes, according to the results of a multidisciplinary research project at the National University of Singapore (NUS).



A minimally invasive “liquid biopsy” like this “could help doctors assess the best therapy options for a patient, and frequent blood tests can also be done during the course of an anti-cancer treatment to monitor a patient’s progress during treatment,” said Professor Lim Chwee Teck of the Mechanobiology Institute (MBI) and Cancer Science Institute of Singapore (CSI) at NUS.

The CTCs were culled from 226 blood samples from 96 patients with early-stage or metastatic breast cancer. Blood samples from 16 healthy patients were used as controls. [*Oncotarget* 2015;6:15578]

The samples were placed in special microwell plates under hypoxic conditions in which CTCs could flourish while other cells died.

CTCs can give rise to recurrent tumours and metastases and they are present even in early stage cancer. But CTCs occur in low frequency and an effective drug screen requires a critical mass of cells. However, conventional methods of getting a critical mass, such as growing tumours in mice, can be expensive and take longer than 2 weeks.

In the microwells, CTC clusters appeared within 14 days, with about a 60 percent success rate from the metastatic breast cancer samples – the highest to date, according to the researchers – and about a 50 percent success rate among early stage cancer samples.

Interrogating individual patients’ cultured CTCs for drug sensitivity “could allow doctors to decide on the most suitable drug for the patient,” said Adjunct Associate Professor Lee Soo Chin, senior consultant at the National University Cancer Institute, Singapore and senior principal investigator at the CSI.

Thee clustering also had possible implications for overall survival (OS), the researcher said. In a sub-group of blood samples from 14 patients with refractory metastatic disease treated again, cluster formation correlated with mean OS of 9.8 months, shorter than the mean 16.6 month OS in patients with no clusters ($p=0.087$)

Though conventional biopsy is still the gold standard for assessing tumours, a liquid biopsy could complement the results, especially over a long period of time.

“Half of these early-stage breast cancer patients have been found to have CTCs in the culture after surgery and post-operative chemotherapy, despite them not having cancer that can be detected using conventional means such as scans and who are presumed cured,” Lee said. “We will need to continue tracking these patients to determine if the persistence of these CTCs is associated with early cancer relapse.”

The image shows a Facebook page header for MIMS Singapore. At the top, there is a navigation menu with several red hexagonal icons and text labels: 'EMPOWERING HEALTHCARE COMMUNITIES', 'MULTISPECIALTY' (with sub-items: OBSTETRICS / GYNAECOLOGY, INFECTIOUS DISEASES, PSYCHIATRY / MENTAL HEALTH, GASTROENTEROLOGY, ENDOCRINOLOGY, RESPIROLOGY, PEDIATRICS, NEPHROLOGY, ONCOLOGY, CARDIOLOGY, PHARMACY, NEUROLOGY), 'SPECIALTY CHANNELS', 'DISEASE RESOURCES', 'DRUG INFORMATION', and 'NEWS & CARE'. Below the menu are three buttons: 'Like Page', 'Liked', and 'Share'. Underneath these buttons is a section titled 'You like this' followed by a row of six small profile pictures of users.