Blood test could lead to improved diagnosis and treatment of breast cancer

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Scientists have discovered that a simple blood test could lead to better diagnosis and treatment for early-stage breast cancer patients, according to an Article published Online First in The *Lancet Oncology*.

The study, led by Professor Anthony Lucci from the Department of Surgical Oncology, University of Texas, USA, builds on earlier work which identified tumour cells circulating in the blood of patients suffering from spreading (metastatic) breast cancer. Tumours are generally thought of as spreading through the lymphatic system rather than the bloodstream, so this earlier research represented a significant departure from the usual means of cancer diagnosis and characterisation.

Professor Lucci and colleagues investigated whether circulating tumour cells (CTCs) could be found in the blood of patients at an earlier stage of disease, where the cancer has not spread beyond its original location (non-metastatic). They also looked at how the presence of CTCs affected survival rates and progression of the disease.

Looking at 302 patients with operable breast cancer, the researchers identified CTCs in the blood of 24% of the study group. They found that the presence of CTCs accurately predicted both progression-free survival and overall survival, with 15% of the patients who tested positive for CTCs relapsing, and 10% dying during the study period (February 2005 to December 2010), as compared to just 3% and 2%, respectively, of patients who did not test positive for CTCs. For patients with a higher concentration of CTCs (three or more per 7.5ml of blood), the correlation with survival and progression rates was even more dramatic, with 31% of these patients dying or relapsing during the study period.

The findings raise hope that in future, blood tests could be used to provide improved diagnosis and treatment for early-stage breast cancer patients.

Currently, diagnosis of early-stage breast cancer often relies on lymph-node removal, which can have unpleasant side-effects. CTC analysis does not appear in current guidelines for the assessment of cancer patients.

"These studies identified that both progression-free and overall survival were worse in patients with one or more circulating tumour cells… the growing body of published work, including our study, suggests that assessment of circulating tumour cells might provide important prognostic information in these patients", according to Professor Lucci.

"If the presence of circulating tumour cells were to contribute independently to the currently available prognostic factors, this information might be useful in disease staging and in identifying patients who might benefit from additional adjuvant therapies."

The research remains at an early stage and further work will be needed before CTCs can be used to guide clinical decision making. In particular, the study included only patients who did not receive preoperative chemotherapy. Since the effects of chemotherapy on CTC concentration are poorly understood, further research into this will be an important factor in developing CTC analysis into a useful diagnostic tool for early-stage breast cancer.

In a linked Comment, Professor Justin Stebbing of the Department of Surgery and Cancer at Imperial College, London, UK, welcomes the findings, although he reiterates the authors' point that more research will be needed before CTCs can be used in a clinical setting: "Larger clinical studies are needed to further clarify the role of CTCs…at present we are in a difficult situation where we have a reliable prognostic biomarker but restricted guidance on how this information should be used, and therefore, until the completion of further studies, we do not envisage patients being treated differently on the basis of these data".

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