

Molecular Cancer Markers 101

565,000 Americans are expected to die of cancer in 2008; more than 1,500 every day.¹ By 2020, the World Health Organization estimates that 15 million people will be diagnosed with cancer and 10 million will die globally.²

Preventative measures, such as smoking cessation and diet, coupled with early detection and treatment have increased survival for most cancer patients over the past few decades. Yet millions of people will still succumb to the disease. However, many of these relapses and deaths could be prevented or, at the very least, delayed through improved detection and diagnosis. For this to happen, greater research of molecular cancer markers is needed.

What is a molecular cancer marker?

Cancer markers are substances found in blood, urine, and tumor and other tissues, that can indicate the presence of cancer before it has the opportunity to progress further in the body. They can be used for:

- Screening, to find early evidence of cancer;
- Staging and treatment planning;
- After surgery, to learn whether the cancer has returned or spread;
- To check how the treatment is working.

What type of research is currently being done in the field of molecular cancer markers?

The discovery of potential molecular markers that may be useful for clinical decision-making in cancer has rapidly increased the need for more focused and systematic research to fully implement and utilize these biomarkers.

Researchers continue to work to find ways to use cancer markers in the early detection of cancer. The table listing the valid early detection tests available for the most common types of cancer shows a void and why this research is necessary.

Scientists are also studying markers to develop additional cancer screening and treatment methods, and to better predict a patient's response to treatment.

Early Detection Tests for Cancer³

<u>Organ Site</u>	<u>Test</u>
Breast	Mammogram
Cervix	Pap smear
Colorectal	Fecal occult blood test, sigmoidoscopy, colonoscopy, double contrast barium enema, digital rectal exam
Esophageal	None
Kidney	None
Liver (primary)	None, but two molecular tests are approved for risk assessment
Lung	Imaging
Ovary	None proven to decrease mortality
Pancreatic	None
Prostate	None proven to decrease mortality

What type of research will we see at this meeting?

This year's meeting will take an in-depth look at three of the most encouraging and exciting molecular markers to be developed in cancer research to date: circulating tumor cells, epidermal growth factor receptor, and vascular endothelial growth factor.

Circulating Tumor Cells (CTC)

CTC levels were first utilized and approved in women with metastatic breast cancer and later in patients with metastatic colorectal cancer. These levels, which are measured before and after therapy, can be used to predict disease progression and survival. It is also speculated that CTC levels can predict disease progression in other solid tumors, including prostate and renal, and hematologic cancers such as chronic myeloid leukemia.⁴

Epidermal Growth Factor Receptor (EGFR)

An EGFR is a cell surface receptor that produces proteins for cell growth and differentiation. Researchers have found a correlation between EGFR overexpression, or overproduction, and a higher risk of relapse in patients with lung, colon, and head and neck cancers. By determining those patients with increased EGFR expression, it is believed that physicians could further refine their treatment plans to include more aggressive chemotherapy regimens or introduce an EGFR inhibitor for these patients.⁵

Vascular Endothelial Growth Factor (VEGF)

Angiogenesis is a major part of tumor growth and development and VEGF is the main regulator gene in this process. Overexpression of VEGF, like EGFR, has also been correlated with poor prognosis of patients with multiple types of tumors. Researchers hope that determination of those patients with high VEGF levels will also mean that they will identify those who might benefit from an angiogenic inhibitor or other novel therapy.^{6,7}

Summary

- 1 American Cancer Society. *Cancer Facts and Figures 2008 Atlanta*. American Cancer Society; 2008.
- 2 Stewart BW, Kleihues P. World cancer report. Geneva: WHO; 2003.
- 3 National Cancer Institute. The Early Detection Network: Investigating in Translational Research on Biomarkers of Early Cancer and Cancer Risk 2008. Bethesda; NIH; 2008
- 4 Bertazza L, Mocellin S, Nitti D. Circulating tumor cells in solid cancer: Tumor marker of clinical relevance? *Curr Oncol Rep*. 2008;10:137-146.
- 5 Vokes EE, Chu E. Anti-EGFR Therapies: Clinical experience in colorectal, lung, and head and neck cancers. *Oncology (Williston Park)*. 2006;20:15-25.
- 6 Golshayan AR, Brick AJ, Choueiri TK. Predicting outcome to VEGF-targeted therapy in metastatic clear-cell renal cell carcinoma: Data from recent studies. *Future Oncol*. 2008;4:85-92.
- 7 Sathornsumetee S, Rich JN. Antiangiogenic therapy in malignant glioma: Promise and challenge. *Curr Pharm Des*. 2007;13:3545-3558.