

# Can Cancer Be Diagnosed With a Blood Test During Routine Examinations?

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**Myth:** Cancer can be detected in asymptomatic patients by a blood draw for tumor biomarkers during routine examinations in a doctor's office. The reliability of tumor biomarkers to diagnose cancer in asymptomatic patients is a frequently asked question in general practice as well as in an oncology setting.

**Answer:** A biomarker is by definition a chemical or substance in the body that has significance in the detection or management of cancer. Biomarkers can be used as an aid to diagnose within specific target populations and to determine the effectiveness of treatment and recurrence of disease. The components of a biomarker generally are present in the blood and tissues of healthy patients but may appear in abnormally large numbers in patients with a malignancy. Tumor markers usually are composed of enzymes, structural proteins, cell surface carbohydrate proteins, receptors, or genes (Hoefner, 2005). An ideal biomarker is one that is easily accessible for testing, such as blood, sputum, urine, or a cheek or throat swab. The biomarker also must have high sensitivity (i.e., low incidence of few false positives in general testing) and high specificity (i.e., few false negatives in general testing) (Hoefner, 2006). A biomarker must be able to be measured with precision so that it can be evaluated objectively and within a clinical setting (Belkowski, Polkovitch, & D'Andrea, 2005). Because biomarkers are found in healthy tissue, sensitivity and specificity often are problematic,

limiting the use for general testing in an asymptomatic population. The size of the tumor may have to be advanced before the level of biomarker is elevated enough to be detected or to reflect a higher-than-normal presence, which can limit use in early detection of cancer. In addition, a level may be present naturally in healthy tissue, which can cause false positives in healthy asymptomatic people at a general screening.

Biomarkers must be cost effective for use in the general population, easily reproducible with a standardized range of values, and specific to a certain tumor type. Genes that are used in tumor markers may be detected but because they are present in all cells, may not provide enough information to identify the organ of origin for the malignancy (Plaut, 2004).

Cancer antigen (CA) 19-9 is a glycosylated protein used in patients with pancreatic cancer to monitor their response to treatment. In addition to pancreatic cancer, CA 19-9 may be elevated in the

blood of patients with liver, colorectal, gastric, and breast cancer. CA 19-9 also can be detected in measurable levels in nonmalignant diagnoses, including cirrhosis, cholestasis, cholangitis, and pancreatitis (Perkins, Slater, Sanders, & Richard, 2003). Elevation of CA 19-9 may be related to one of several cancers or a more benign condition, making this biomarker ineligible as a specific screening marker for cancer.

Carcinoembryonic antigen (CEA) is another marker that is elevated in several disease states, including colorectal, lung, and breast cancer. CEA is a glycoprotein that is involved in cell adhesion. CEA was discovered in the mid 1960s and has been used predominantly to monitor response to treatment for patients with colorectal cancer. CEA is not effective in generalized screening because of low sensitivity as well as its presence in multiple disease states (Hoefner, 2005).

Cancer antigen 125 also is a glycoprotein often associated with ovarian

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