

## **Tumor Marker Tests** [1]

This section has been reviewed and approved by the [Cancer.Net Editorial Board](#) [2], 03/2013

Tumor markers (also known as biomarkers) are substances found at higher than normal levels in the blood, urine, or body tissue of some people with cancer. Although cancer cells often produce tumor markers, other healthy cells in the body produce them as well.

### **Tumor markers and cancer**

Along with other diagnostic tests, testing for tumor markers can indicate the presence of cancer and help doctors make treatment decisions. Tumor markers are most commonly used to do the following:

**Screen high-risk individuals.** Doctors may test for tumor markers to help find cancer in healthy or high-risk people before symptoms develop.

**Confirm the diagnosis.** Tumor markers may be used to confirm the results of other tests and procedures. However, the presence or amount of a tumor marker alone is not enough to diagnose cancer.

**Predict prognosis.** Tumor markers can help the doctor predict the cancer's behavior and response to treatment, as well as a person's chance of recovery.

**Guide treatment decisions.** Some tumor markers help doctors decide whether to add [chemotherapy](#) [3] (the use of drugs to kill cancer cells) or [immunotherapy](#) [4] (biologic therapy; treatment designed to boost the body's natural defenses to fight the cancer) after surgery and/or radiation therapy. Other tumor markers help doctors choose which drug(s) or regimens (schedules for these drugs) will be most beneficial for an individual patient.

**Monitor treatment.** Doctors may use changes in the presence or amount of one or more tumor markers to assess how the cancer is responding to treatment.

**Predict or monitor for recurrence.** Tumor markers may be used to determine the chance that the cancer will come back after treatment. For some patients, looking for changes in the amount of a tumor marker may be part of their follow-up care plan and may help detect a recurrence sooner than other methods.

### **Limitations of tumor markers**

Tumor markers are not foolproof. Usually doctors need results from other tests, such as an x-ray or [biopsy](#) [5] (the removal of a small amount of tissue for examination under a microscope), to determine whether the presence of a particular tumor marker is a cause for concern. This is because:

- An elevated tumor marker level may be caused by a condition or disease other than cancer.
- Some tumor marker levels may be high in people without cancer.
- Tumor marker levels may vary over time, making it hard to get consistent results.
- The level of a tumor marker may not rise until a person's cancer is advanced, which is not helpful for early detection, screening, or monitoring for recurrence.

### **Testing for tumor markers**

To test for tumor markers, the doctor will take a sample of blood or urine and send it to a laboratory for analysis. A biopsy sample or surgical specimen may also be used to test for tumor markers. Some tests must be repeated because the levels of tumor markers can change from month to month. This is called serial testing.

As with other laboratory tests, a reliable tumor marker test must be both specific and sensitive.

**Specificity.** If either the tumor marker itself or the test used to detect or measure it is not specific enough, there is a chance that the results could suggest a tumor is present, or growing despite treatment, when it is not (a false positive). In this case, a healthy person may go through unnecessary tests and anxiety.

**Sensitivity.** If the tumor marker or the test is not sensitive enough, the results may suggest a tumor is not present when it actually is or that it is responding to treatment when it is not (a false negative). In this case, a person who may benefit from additional testing and treatment may not receive it.

### **Examples of tumor markers in cancer**

The following are examples of tumor markers often associated with cancer. Please talk with your doctor or another member of your health care team to learn more about specific tumor markers.

**Human epidermal growth factor receptor 2 (HER2).** This tumor marker is a specialized protein on breast cancer cells that helps control cancer growth and spread. Women with tumors that have high levels of HER2 benefit from certain drugs, including trastuzumab (Herceptin). Learn more about [HER2 testing for breast cancer](#) [6].

**Carcinoembryonic antigen (CEA).** This tumor marker may be found at elevated levels in people

with different types of cancer, but it is most often associated with colorectal cancer. Read more about [CEA and other tumor markers for gastrointestinal cancers](#) [7].

**Prostate-specific antigen (PSA).** PSA is a protein made by the prostate gland. PSA levels are high in men with prostate cancer, prostatitis (inflammation of the prostate), or benign prostatic hyperplasia (BPH, a condition in which prostate cells grow and block the flow of urine). A PSA test can be used to screen for prostate cancer; however, the value of this screening test for men who have no symptoms of prostate cancer remains under debate. In addition, PSA tests are used to find out if prostate cancer has returned after treatment. Learn more about [PSA testing](#) [8].

**KRAS.** This tumor marker (pronounced kay-rass) is a gene that is changed, or mutated, in 30% to 40% of colon tumors. ASCO recommends that people who have colon cancer that has spread outside the colon to other areas of the body should have a test to find out if the tumor has mutations in the *KRAS* gene. The test helps predict which patients may benefit from specific drugs.

**Cancer antigen 125 (CA 125).** This protein is found on the surface of many ovarian cancer cells and can be detected with a blood test. Although women with ovarian cancer often have an elevated level of CA 125, an elevated CA 125 level doesn't always mean you have ovarian cancer. An increase in CA 125 may be caused by another type of cancer, including endometrial, peritoneal, or fallopian tube cancer, or a non-cancerous condition, such as uterine fibroids, endometriosis, pelvic inflammatory disease, cirrhosis, pregnancy, or normal menstruation.

### Questions to ask the doctor

Consider asking your doctor or another member of your health care team the following questions:

- Do you recommend that I have any tumor marker tests? If so, which ones?
- Which ones have you already performed, if any?
- How are these tests performed? How often should I have them?
- Can you explain the test results?
- If I have abnormal levels of a tumor marker, what does that mean? How does it affect my treatment?
- Where can I get more information about tumor markers?

Cancer survivors should also ask how tumor marker tests may be used in their follow-up care.

### More Information

[Tests and Procedures](#) [9]

[What to Know: ASCO's Guideline on Tumor Markers for Breast Cancer](#) [10]

[Understanding Targeted Treatments](#) [11]

[Dealing With Cancer Recurrence](#) [12]

### Additional Resource

## National Cancer Institute: Tumor Markers Fact Sheet [13]

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### Links:

- [1] <http://www.cancer.net/navigating-cancer-care/diagnosing-cancer/tests-and-procedures/tumor-marker-tests>
- [2] <http://www.cancer.net/about-us>
- [3] <http://www.cancer.net/node/24723>
- [4] <http://www.cancer.net/node/24726>
- [5] <http://www.cancer.net/node/24406>
- [6] <http://www.cancer.net/node/25671>
- [7] <http://www.cancer.net/node/25736>
- [8] <http://www.cancer.net/node/27651>
- [9] <http://www.cancer.net/node/24959>
- [10] <http://www.cancer.net/node/29851>
- [11] <http://www.cancer.net/node/24729>
- [12] <http://www.cancer.net/node/25042>
- [13] <http://www.cancer.gov/cancertopics/factsheet/Detection/tumor-markers>