Tumor Markers

Tumor markers are substances, usually proteins, that are produced by the body in response to cancer growth or by the cancer tissue itself. Some tumor markers are specific for one type of cancer, while others are seen in several cancer types. Many of the well-known markers are seen in non-cancerous conditions as well as in cancer. Consequently, these tumor markers are not diagnostic for cancer.

WHY ARE THEY DONE?

Tumor markers are not diagnostic in themselves. A definitive diagnosis of cancer is made by looking at biopsy specimens (for example, of tissue) under a microscope. Tumor markers provide information that can be used to:

- **Screen** - Most markers are not suited for general screening, but some may be used in those with a strong family history of a particular cancer. In the case of genetic markers, they may be used to help predict risk in family members. PSA testing for prostate cancer is an example.
- **Help diagnose** - In a patient that has symptoms, tumor markers may be used to help identify the source of the cancer, such as CA-125 for ovarian cancer, and to help tell it apart from other conditions. Tumor markers can not diagnose cancer themselves but aid in this process.
- **Stage** - If a patient does have cancer, tumor marker elevations can be used to help determine how far the cancer has spread into other tissues and organs.
- **Determine prognosis** - Some tumor markers can be used to help caregivers determine how aggressive a cancer is likely to be.
- **Guide Treatment** - Some tumor markers, such as Her2/neu, will give caregivers information about what treatments their patients may respond to (for instance, breast cancer patients who are Her2/neu positive are more likely to respond to Herceptin therapeutic drug treatment).
- **Monitor Treatment** - Tumor markers can be used to monitor the effectiveness of treatment, especially in advanced cancers. If the marker level drops, the treatment is working; if it stays elevated, adjustments are needed. The information must be used with care, however. CEA, for instance, is used to monitor colorectal cancer, but not every colorectal cancer patient will have elevated levels of CEA. If the marker level is not initially elevated with the cancer, it cannot be used later as a monitoring tool.
- **Determine recurrence** - Currently, one of the biggest uses for tumor markers is to monitor for cancer recurrence. If a tumor marker is elevated before treatment, low after treatment, and then begins to rise over time, then it is likely that the cancer is returning. (If it remains elevated after surgery, then chances are that not all of the cancer was removed.

COMMON TUMOR MARKERS CURRENTLY IN USE

Tumor Markers	Cancers	What else?	When/How Used	Sample
AFP (Alpha-feto protein)	Liver, germ cell cancer of ovaries or testes	Also elevated during pregnancy	Help diagnose, monitor treatment, and determine recurrence	Blood
CA 15-3 (Cancer antigen 15-3)	Breast and others including lung, ovarian	Also elevated in benign breast conditions; caregiver can use CA 15-3 or CA 27.29 (two different assays for same marker)	Stage disease, monitor treatment, and determine recurrence	Blood
CA 19-9 (Cancer antigen 19-9)	Pancreatic, sometimes colorectal and bile ducts	Also elevated in pancreatitis and inflammatory bowel disease	Stage disease, monitor treatment, and determine recurrence	Blood

CA-125 (Cancer antigen 125)	Ovarian	Also elevated with endo-metriosis, some other diseases and benign conditions; not recommended as a general screen	Help diagnose, monitor treatment, and determine recurrence	Blood
CEA (Carcino-embryonic antigen)	Colorectal, lung, breast, thyroid, pancreatic, liver, cervix, and bladder	Elevated in other conditions such as hepatitis, COPD, colitis, pancreatitis, and in cigarette smokers	Monitor treatment and determine recurrence	Blood
Estrogen receptors	Breast	Increased in hormone- dependent cancer	Determine prognosis and guide treatment	Tissue
hCG (Human chorionic gonadotropin)	Testicular and trophoblastic	Elevated in pregnancy, testicular failure	Help diagnose, monitor treatment, and determine recurrence	Blood, urine
Her-2/neu	Breast	Oncogene that is present in multiple copies in 20-30% of invasive breast cancer	Determine prognosis and guide treatment	Tissue
Monoclonal immunoglobulins	Multiple myeloma and Waldenstrom's macroglobulinemia	Overproduction of an immunoglobulin or antibody, usually detected by protein electrophoresis	Help diagnose, monitor treatment, and determine recurrence	Blood, urine
Progesterone receptors	Breast	Increased in hormone-dependent cancer	Determine prognosis and guide treatment	Tissue
PSA (Prostate specific antigen), total and free	Prostate	Elevated in benign prostatic hypertrophy, prostatitis and with age	Screen for and help diagnose, monitor treatment, and determine recurrence	Blood

FOR MORE INFORMATION, VISIT: http://www.labtestsonline.org/

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