

Tumour Markers

What are Tumour Markers?

Tumour markers are substances that can be found in the body when cancer is present. They are usually found in the blood or urine. They can be products of cancer cells or of the body in response to cancer. Most tumour markers are proteins.

For many reasons, tumour marker itself is usually not enough to diagnose or rule out cancer. Most tumour markers can also be made by normal cells as well as by cancer cells. Sometimes, non-cancerous conditions can also cause elevation of some tumour markers to be higher than normal. Besides, not every cancer patient may have raised level of a tumour marker.

How Are Tumour Markers Used?

- (I) For Screening and Early Detection of Cancer
- (II) Diagnosing Cancer
- (III) Determining the Prognosis (Outlook) for Certain Cancers
- (IV) Determining the Effectiveness of Cancer Treatment
- (V) Detecting Recurrent Cancer

Tumour Markers commonly used:

Name	Comments
Alpha-fetoprotein (AFP)	<ul style="list-style-type: none"> ● AFP is elevated in hepatocellular carcinoma of liver and is useful to monitor response to treatment. ● AFP is also elevated in certain testicular cancers (embryonal cell & endodermal sinus types)
CA 15-3	<ul style="list-style-type: none"> ● CA 15-3 can be used to monitor breast cancer patients

	<ul style="list-style-type: none"> ● Elevated blood levels are found in <10% of patients with early disease and in about 70% of patients with advanced disease ● CA 15-3 levels usually drop following effective treatment ● But CA 15-3 can also be elevated in other cancers & in some non-cancerous conditions such as benign breast conditions & hepatitis
<p>CA 125</p>	<ul style="list-style-type: none"> ● CA 125 is the standard tumour marker to follow patients with epithelial ovarian cancer during or after treatment ● >90% of patients with advanced ovarian cancer have elevated CA 125 ● Because about half of ovarian cancer patients with elevated CA 125 still have tumour confined to the ovary, CA 125 is being studied as screening test for ovarian cancer (See next section for details) ● CA 125 can also be raised in patients with endometrial and pancreatic cancer as well as in benign conditions such as endometriosis, pelvic inflammatory disease and benign ovarian cysts
<p>CA 19-9</p>	<ul style="list-style-type: none"> ● CA 19-9 is considered the best tumour marker for following patients with pancreatic cancer. ● A high level in a newly diagnosed patient usually means advanced disease ● CA 19-9 is not used as a screening test because usually it will not detect early disease ● CA 19-9 may also be used to monitor colorectal cancer, but because it is less sensitive than CEA test, most would recommend CEA ● CA 19-9 can also be raised in other cancers such as stomach and bile ducts cancer and in some non-cancerous conditions such as pancreatitis
<p>Carcinoembryonic</p>	<ul style="list-style-type: none"> ● CEA is the preferred tumour marker to monitor

<p>antigen (CEA)</p>	<p>patients with colorectal cancer during treatment, but it is not useful as a screening or diagnostic test</p> <ul style="list-style-type: none"> ● The higher the CEA level at time of diagnosis, the more likely it is that the disease is advanced ● CEA can also be raised in cancer of lung, breast, thyroid, pancreas, liver, stomach, ovary and bladder ● It can also be elevated in non-cancerous diseases and in chronic smokers
<p>Estrogen / Progesterone receptors</p>	<ul style="list-style-type: none"> ● Breast tumour samples (not blood samples) from patients with breast cancer are tested for these markers
<p>HER2 (Human Epidermal Growth Factor receptor 2, also known as EGFR 2)</p>	<ul style="list-style-type: none"> ● About 25% of patients with breast cancer have tumours that overexpress HER2, which is associated with aggressive disease, poor clinical outcomes and shortened overall survival ● Samples of tumour tissue (not blood sample) are used to test for HER2 status
<p>Human chorionic gonadotrophin (HCG, also known as beta-HCG)</p>	<ul style="list-style-type: none"> ● HCG blood levels are elevated in patients with some types of testicular & ovarian cancers (germ cell tumours), gestational trophoblastic disease, (mainly choriocarcinoma), mediastinal germ cell tumour ● Serum HCG level can be used to help diagnose these tumours, monitor response to treatment and detect recurrence
<p>Prostate-specific antigen (PSA)</p>	<ul style="list-style-type: none"> ● PSA is a tumour marker for prostate cancer ● It is the <u>only</u> marker used to screen for a common type of cancer (although some medical groups do not recommend its use) ● Apart from prostate cancer, PSA level can also be raised in patients with benign prostatic hyperplasia, elderly men and those with larger

	prostates
Thyroglobulin	<ul style="list-style-type: none"> ● Thyroglobulin is a protein made by thyroid gland ● Thyroglobulin levels are raised in many thyroid diseases, including some common forms of thyroid cancer ● After complete & successful treatment of thyroid cancer, serum thyroglobulin level should fall to undetectable levels. A subsequent rise may suggest that the tumour have recurred ● In patients with metastatic thyroid cancer, thyroglobulin levels can be used to evaluate the results of treatment over time

In summary, tumour markers may be used to help diagnose cancer, predict and monitor response to treatment and determine whether cancer has recurred after treatment. In general, tumour markers alone cannot be used to diagnose cancer, they must be combined with other tests. Studies are being done to determine if tumour markers can be used in early detection and diagnosis of cancer.

Dr Anthony C H Ying, Chairman "Cancer Detection & Prevention Subcommittee" The Hong Kong Anti-Cancer Society
February 2009