



Tumor Markers in the General Practice - Clinical use and Value

by Dr. Adele Visser

Introduction

Tumor markers represent a variety of cellular products and subunits, aimed at providing an accessible manner for early detection, prognostication and monitoring of malignant disease.

These vary from cellular surface antigens, cytoplasmic proteins and enzymes, hormones, oncofetal antigens, oncogens and receptors and may be present in the tumor itself or be altered qualitatively or quantitatively within the cancerous or precancerous state. It can be measured in tissues and fluids (mostly utilized by pathologists in diagnosis) or in serum. Measurement in serum is mostly utilized by clinicians and will functionally be used for:

1. Screening and early detection.
2. Diagnostic confirmation.
3. Prognosis and Prediction and monitoring of therapeutic response.
4. Monitoring disease and recurrence.

Current validated use for Tumor Markers

However appealing this notion is, no single tumor marker has been developed that complies with these criteria and cross-reaction occurs in benign disease.

In an attempt to address these issues, various professional bodies have attempted to combine serum tumor markers with various procedures (mostly imaging) and redefining reference ranges in terms of change velocity and age, with some success, however not universally accepted at this point.

At present, tumor markers are largely validated for use in the monitoring of confirmed disease through the use of marker kinetics.

For this to be of clinical value, these assays need to be performed using the same methods, preferably the same laboratory site.

Table 1. The ideal tumor marker has certain characteristics (adapted from reference 1).

Characteristics	Comments
Highly specific.	Detectable only in one tumor type.
Highly sensitive.	Non-detectable in benign disease.
Long lead-time.	Sufficient time for alteration of natural disease course
Levels correlate with tumor burden.	Prognostic and predictive utility.
Short half-life.	Useful in serial monitoring.
Simple and cheap test.	Applicable as screening test.
Easily obtainable specimen.	Acceptability by target population.



Table 2. Current use of serological tumor markers

Tumor marker	Associated malignancies			Non-malignant conditions (limited list)	Potential clinical uses
	Primary	Secondary	Ectopic production		
Oncofetal antigens - AFP	Primary HCC	Teratoblastoma (ovary/testes)	GIT, renal, breast,bladder, ovarian carcinoma	Pregnancy Liver disease	S,D,P,M
- CEA	Colorectal carcinoma	Various carcinomas			P,M
Hormones - β HCG	Choriocarcinoma	Testicular / trophoblastic tumors Cancer, liver, renal cancer	Gastric, pancreas carcinoma Lung, islet cell, carcinoid, breast, ovary carcinoma	Pregnancy Marijuana use	D,P,M
- Calcitonin	Medullary carcinoma	Thyroid, liver, renal cancer	Endocrine tumors	Renal failure	S,M,P
- Metanephrines	Pheochromocytoma	Neuroblastoma / Ganglioneuroma		Use of PPI's	D
- Chromogranin A	Pheochromocytoma	MEN, small-cell lung, carcinoid		Dietary, drugs	
- IGF-1	Neuroblastoma Pituitary cancer	Insulinoma		PPI's	
Glycoproteins - CA 15-3	Breast cancer	Various carcinomas		Cirrhosis / Granulomas GIT inflam. RA	M,R P,M
- CA 19-9	Pancreatic / gastric carcinomas	Various carcinomas			
- CA 72-4	Gastric carcinoma	Various carcinomas		Breast, ovarian liver disease	
- CA 125	Ovarian carcinoma	Various carcinomas		Reproductive cycles, GIT inflammation	M,D,R
Isoenzymes - PSA - NSE	Prostate carcinoma Small-cell lung carcinoma	Neuroblastoma, kidney tumors		BPH PPI's, haemolysis, renal failure	S,M,D,P
Cell components - TAG 72	Gastric carcinoma	Colorectal, lung, pancreas, ovarian cancers			S,M,D,P
- Immunoglobulins	Multiple myeloma	Gammopathies			

M = monitoring R = Recurrences S = Screening P = Prognosis D = Diagnosis RT = Response to therapy

References

- Sharma S. 2009. Tumor markers in clinical practice: General principles and guidelines. In J Med Paediatr Oncol. 30(1):1-8