

# TUMOUR MARKERS IN UROLOGY

Essay

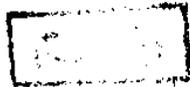
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# **INTRODUCTION**

## INTRODUCTION

In the past, malignant neoplasms were distinguished from normal tissues mainly by the application of the classical morphological criteria as observed with the light microscope.

Later with the addition of various histochemical and electron microscopic procedures, particular kinds of cancer became more easily recognized. More recently, in parallel with morphologic studies of cancer, such as investigations of chromosome abnormalities, the search for biochemical markers has intensified.

Actually the investigations concerned with tumour markers started since the isolation of carcinoembryonic antigen from tumours of human colon in 1965, followed by the demonstration that many human cancer produce a variety of substances such as oncofetal antigens and ectopic hormones.

A reliable marker should be sensitive enough to detect a minimal amount of the disease, hence no false negative results, also should be specific enough, so no false positive results in normal subjects. The sensitivity of a marker is the number of positive cases per 100 patients with the disease. While specificity is the number of negative results per 100 people who do not have tumours (controls).

Many markers have been investigated in the genitourinary system, though non of them was proved to be an ideal marker, they are still helpful aids when their data are combined with other conventional ivestigatory procedures.

This essay reviews the tumour markers in the genitourinary system, with special emphasis to the more clinically useful markers.

# **CHAPTER I**

## Definition Of Tumour Markers

# CHAPTER I

## DEFINITION OF TUMOUR MARKERS

**An ideal tumour marker would:-**

- 1) Be a substance that is not normally present in blood.
- 2) Give a uniformly positive test results in all patients.
- 3) Be present with its specific tumour, in a concentration proportional to the size or activity of the tumour.

By these criteria, no ideal tumour markers have been found i.e. current tumour markers are neither highly sensitive, nor tumour - specific.

Therefore, the principal value of these markers is in estimating prognosis or in monitoring response to therapy, not in screening for occult disease. So it is better now to define a tumour marker as any substance that can be related to the presence or progress of a tumour.

This later definition implies that a marker does not necessarily have to be tumour - specific, but may be substance secreted (into blood or serous fluids) or expressed (at the cell surface) in larger quantities by malignant cells and may thus represent a relative rather than an absolute marker of malignancy.

Also this will enable us to include all markers that are actually produced within the tumour, whether by malignant or stromal cells, tumour - derived (for example the oncofetal

antigens) and all markers produced by non-malignant cells as a result of disturbance by the tumour, i.e. tumour associated (for example the acute phase proteins, urinary hydroxproline output, and many enzymes).

**Clinical applications of markers:-**

A) Diagnostic:-

- a) Screening for the presence of malignancy.
- b) Differential diagnosis of malignancy.

B) Prognostic:-

Detection of micrometastasis after curative therapy.

C) Monitoring:-

The response to therapy for metastatic disease.

**Classification of tumour markers:-**

As a result of the extensive investigations carried out in recent years, three groups of markers have emerged:-

- 1) Tumour specific markers:- i.e. produced only by the malignant cells.
- 2) Tumour associated markers:- which comprise substances secreted by normal or benign epithelial cells, which when

produced by invasive carcinomatous tissue, are released in the circulatory system in excessive quantity.

- 3) Altered body proteins markers:- which are normal body proteins that undergo changes in blood level as a result of the presence of the carcinoma.

**Types of tumour markers:-**

- 1) Immunologic:- Antigens and antibodies including oncofetal antigens.
- 2) Enzymes:- As phosphatases, renin and lactic dehydrogenase.
- 3) Hormones:- As erythropoietin, and aldosterone.
- 4) Metabolic products:- As polyamines.
- 5) Protein degradation products:- As fibrinogen degradation products.

**CHAPTER II**  
Tumour Markers  
In Renal Carcinoma

## CHAPTER II

### TUMOUR MARKERS IN RENAL CARCINOMA

#### A) Markers in renal cell carcinoma:-

##### 1) Renin:-

Renin is a proteolytic enzyme, secreted by the juxtaglomerular apparatus in response to hypocalcaemia, hypotension or renal artery stenosis.

Renin acts on a glycoprotein secreted by the liver to form angiotension I which is converted in the lung to angiotensin II by converting enzymes.

This angiotensin II is the most powerful vasoconstrictor known and it acts on the adrenal cortex leading to increased secretion of aldosterone.

#### Value of renin as a marker in renal cell carcinoma:-

Some renal cell carcinomas have been reported to be associated with elevated serum renin, and these patients have usually been cured of their hypertension after nephrectomy. However, it is not clear whether the primary or recurrent tumour can actually synthesize this marker. (Javadpour, 1980).

Suffrin and associates had found elevated plasma renin in 37% of patients with high-grade, high-stage renal cell carcinoma of mixed histologic cell type, and predicted a poor prognosis. (Javadpour, 1980).

It was observed that patients with adenocarcinoma who had normal renin levels had a better prognosis than those who had elevated plasma renin levels.

#### **Relation of renin level and metastasis:-**

Plasma renin level was found elevated in about 80% of patients with metastasis.

It was noted that following nephrectomy, the patients with elevated preoperative renin level, had significant decrease in plasma renin level, and this may be a useful measure of occult disease. (Sufirin et al., 1977).

#### **Summary:-**

Plasma renin level was found elevated in about one third of patients with renal adenocarcinoma. Though it cannot be used as screening tests in patients with renal mass, it could be helpful to monitor the course of the disease following nephrectomy when its level significantly declines.

#### **2) Erythropoietin:-**

Erythropoietin hormone is essential for maintenance of normal erythropoiesis.

It is a glycoprotein of M.W. 35,000, it causes certain stem cells in bone marrow (known as erythropoietin-sensitive stem cells) to be converted to proerythroblasts.