Current Trends in Natural Sciences Vol. 7, Issue 14, pp. 272-275, 2018

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

UTILITY OF TUMOR MARKERS AS A DIAGNOSTIC TOOL

Ionica Deliu [1]*, Mariana Cristina [1], Georgeta Dumitru [1]

[1] University of Pitesti, Faculty of Sciences, Physical Education and Informatics
Targul din Vale Street, no1, Pitesti, Romania

Abstract
Since the beginning of immunodiagnostic, the tumor markers were used for population screening, tumor diagnosis or prognosis, even tumor detection. These markers are biochemical indicators for presence of various tumors and we often can find them into blood. They are proteins, glycoproteins, hormones, enzymes or other specific molecules.
The most used technique for detection in blood or other body fluids of tumor markers involves monoclonal antibodies, because they can interact with specific antigens from tissues or blood.
In this paper we want to highlight the importance of tumor markers detection in the management of cancer diseases and to present some data about the incidence of breast, ovarian and respective prostate cancer in three patients groups from Arges County in 2017.
All blood samples were processed by immunoenzymatic method with VIDAS immunoanalysis system in SoloMed medical laboratory. The values obtained for samples were evaluated and the results were linked to other medical investigations.
Just 2.74% of investigated women had increasing values of CA 15-3, significant for breast cancer and 3.65% of investigated women had significant values of CA 125 (important in ovarian cancer). Inappropriate values with age-specific reference ranges of PSA were determined for 8.97% of investigated male patients, but only 5.12% were later on diagnosed with prostate cancer.
These results suggest the significance of laboratory test in accurate evaluation of cancer disease.

Keywords: Cancer, Monoclonal antibody, Tumor markers.

1. INTRODUCTION

The tumor markers are biochemical indicator in cancer disease. They are molecules associated with malignancy, being specific to a group of malignancies or only to an organ and widely used today as valuable aid in detection and monitoring the growth of the tumor or in management of cancer patients (Malati, 2007, Kumar et al., 2014). The tumor markers are used as screening tools, too. This involves the detection of markers in individuals without symptoms of diseases, usually in preclinical state (Duffy, 2013).
In 1864 was described the first tumor marker, the Bence-Jones protein (in urine). Since then were used many other markers and the laboratory methods for detection and description are in progress.
Researchers describe the tumor markers as a quantitatively or qualitatively altered substance in precancerous or cancerous conditions (Schrohl et al., 2003). Various assays can be used to detect these modifications, which are produced either by tumor cells or by the normal cells nearby the tumor, as a response to tumor presence.

*Corresponding author, E-mail address: ionica.deliu@upit.ro

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

Tumor markers can be detected in different samples, like blood (plasma), urine, saliva or tissue, using sensitive immunoassays with monoclonal or polyclonal antibodies (e. g. RIA and ELISA).
Tumor markers are usually classified as oncofetal antigens, tumor associated antigens, hormones, enzymes and isoenzymes, serum and tissue proteins or other molecules, like polyamines (Malati, 2007).
The detection of tumor markers has advantages and disadvantages. They can be easy measured with automated assays, often cheaper than histological or endoscopy procedures and the results are both qualitative and quantitative (Duffy, 2013). However tumor markers have limitations like a low or absent sensitivity and specificity. Hence the markers should be used in association with other investigations.
The tumor marker for breast cancer, CA 15-3 and the tumor marker for ovarian cancer, CA 125, are tumor associated antigens.
CA 15-3 is a glycoprotein antigen mucin-like produced by tumor cells; can be detected in breast cancer or in benign breast diseases, with increased values, more than 22-30 UI/mL. The most important clinical usage is the monitoring of therapy in metastatic cancers, but the carcinoembryonic antigen (CEA) levels combined with CA 15-3 levels may provide useful information for diagnosis and treatment (Shao, 2015).
CA 125 is a tumor associated glycoprotein, interrelated with epithelial ovarian carcinoma. The CA 125 levels are less than 35 IU/mL in healthy women, without benign or malignant ovarian mass (Malati, 2007). Higher levels were also reported in malignancies of breast, colorectal, gastric, liver, lung as well as in benign conditions (Handy, 2009). While CA 125 is the best marker today for the epithelial ovarian malignancies, CA 125 alone is not enough for cancer diagnosis.
PSA (Prostate Specific Antigen or gammaseminoprotein) is a glycoprotein with 93% amino acids and 7% carbohydrate, a serine protease secreted by prostatic epithelium, in minor amount in blood circulation. This tumor marker is relevant for prostate carcinoma. The normal range of PSA levels depend of men ages and usually is 0.0 to 4.0 ng/mL. The abnormal values of PSA must be combined with a digital rectal exam (Handy, 2009).

2. MATERIALS AND METHODS

The samples were collected from 1643 female patients (766 for CA 15-3 and 877 for CA 125 investigation), and 468 male patients (for PSA investigation) in Arges County, in 2017.
The samples consist of blood (serum) samples and the method to detect of tumor markers was ELFA (Enzyme Linked Fluorescent Assay), with VIDAS immunoanalysis system.
The amount of tumor markers was established by VIDAS system and the approach of the values was made in correlation with normal range.

3. RESULTS AND DISCUSSIONS

Among 766 female patients tested for CA 15-3 (between 20 to 89 years old), 2.74% had values higher than 30 UI/mL; among these cases 70.83% had between 40 to 59 years (Figure 1). These patients had the suspicion of breast diseases (benign or malignancies diseases) and the results must be combined with clinical exams and other laboratory tests.
Among 877 female patients tested for CA 125 (between 20 to 89 years old), 3.65% had values higher than 35 UI/mL (Figure 2); among these cases 40.25% had between 50 to 59 years.
In both cases, the group of patients with age under 30 years or above 70 years presented few cases with abnormal values of cancer antigens.

*Corresponding author, E-mail address: ionica.deliu@upit.ro

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

The group of male patients consisted of 468 men with ages between 24 and 87 years. Among these cases 8.97% (42 patients) had higher values of PSA than normal values (according to the age of patient, Figure 3); 3.84% of the cases were confirmed after on with benign prostate tumors, and 5.12% with prostate cancer. The most affected age group by prostate cancer was above 70 years old (15 among 24 cases).

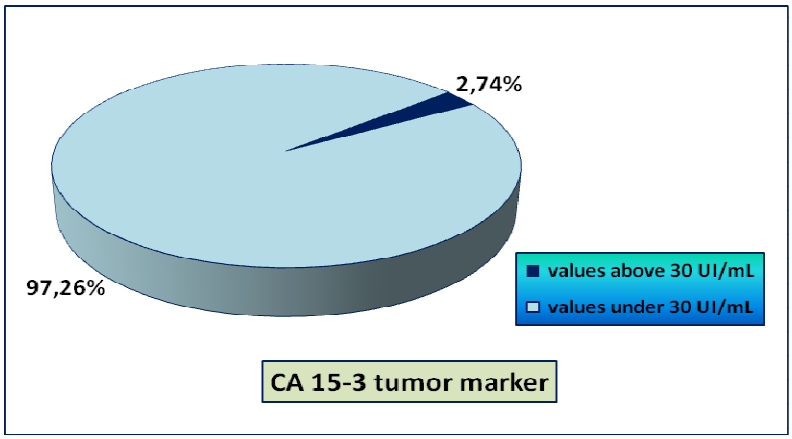

Figure 1. The incidence of elevated values of CA 15-3 in female tested group

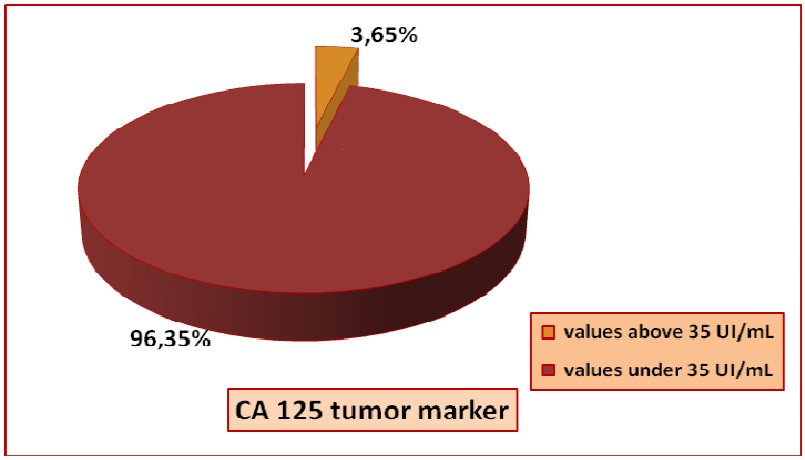

Figure 2. The incidence of elevated values of CA 125 in female tested group

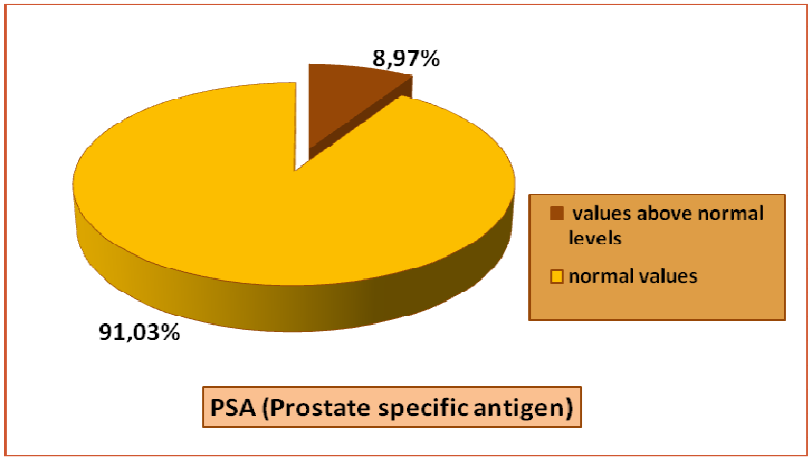

Figure 3. The incidence of elevated values of PSA in male tested group

*Corresponding author, E-mail address: ionica.deliu@upit.ro

Current Trends in Natural Sciences (on-line)
ISSN: 2284-953X
ISSN-L: 2284-9521

Current Trends in Natural Sciences (CD-Rom)
ISSN: 2284-9521
ISSN-L: 2284-9521

4. CONCLUSIONS

Nowadays the laboratory tests are useful and important tools to establish the diagnostic of some diseases. Tumor markers can be detect by minimally invasive methods and provide valuable information in monitoring cancer diseases. Among the three discussed markers, only PSA have been proven to be appropriate for screening purpose, combined with a digital rectal exam.

The incidence of elevated values of tumor markers revealed the importance of interrelations with other clinical and laboratory tests and confirmed the incidence of specific diseases for certain age groups.

5. REFERENCES

Duffy, M. (2013). Tumor Markers in Clinical Practice: A Review Focusing on Common Solid Cancers, *Med Princ Pract*, 22, 4–11.

Handy, B. (2009). The Clinical Utility of Tumor Markers, *Labmedicine*, 40(2), 99-103.

Kumar, K., Jain, P., Sinha, A., Singh, K.K., and Sharma, H.P. (2014). Clinical Significance of Tumour Markers, *American Journal of Phytomedicine and Clinical Therapeutics (AJPCT)*, 2(8), 1005-1015.

Malati, T. (2007). Tumour markers: an overview, *Indian Journal of Clinical Biochemistry*, 22(2), 17-31.

Schrohl, A. S., Holten-Andersen, M., Sweep, F., Schmitt, M., Harbeck, N., Foekens, J., and Brünner, N. (2003). Tumor Markers - from laboratory to clinical utility, *Molecular & Cellular Proteomics* 2.6, 378-387.

Shao, Y., Sun, X., He, Y., Liu, C., Liu, H. (2015). Elevated Levels of Serum Tumor Markers CEA and CA15-3 Are Prognostic Parameters for Different Molecular Subtypes of Breast Cancer, PLOSONE|DOI:10.1371/ journal.pone.0133830, 1-11.

*Corresponding author, E-mail address: ionica.deliu@upit.ro