

SHORT COMMUNICATION



## The tumor markers: Diagnostic tools in cancer detection and monitoring

Mohamed Hasan<sup>1</sup> and Osama Kame<sup>1</sup>

<sup>1</sup>Department of Medicine, Universitas Indonesia, Indonesia

### ABSTRACT

Excrement labels are natural substances produced by cancer cells or normal cells in response to cancer or certain benign conditions. These labels are set up in blood, urine, or stool samples and can give pivotal information in the opinion, prognostic, and monitoring of cancer progression and treatment efficacy. While excrement labels are not definitive for diagnosing cancer, they play a vital part in cancer discovery, patient operation, and post-treatment surveillance. This composition delves into the types of excrement labels, their clinical operations, limitations, and advancements in the field, slipping light on their significance in the early discovery and operation of cancer.

### KEYWORDS

Tumor; Cancer cells;  
Inflammation; Mutations;  
Necropsies; Hormones

### ARTICLE HISTORY

Received 27 January 2025;  
Revised 25 February 2025;  
Accepted 06 March 2025

### Introduction

Cancer, one of the leading causes of death worldwide, remains a complex complaint by unbridled cell growth and spread to other corridor of the body. Beforehand discovery and accurate opinion are vital for perfecting survival rates and icing effective treatment. One tool that has gained adding attention in the opinion, prognostic, and monitoring of cancer is the use of excrement labels. Excrement labels are motes produced by excrement cells or in response to cancer and can be detected in colorful natural fluids similar as blood, urine, or stool samples. These labels are not only essential for detecting cancer at an early stage but also for covering the complaint during and after treatment [1].

Excrement labels encompass a wide variety of substances, including proteins, hormones, enzymes, and other motes, which may be released into the bloodstream by cancerous cells or normal cells in response to the presence of an excrement. Although excrement labels can give precious information, they're frequently not entirely specific to cancer and can be told by other factors, similar as inflammation or benign conditions [1,2]. Thus, excrement labels are generally used in confluence with other individual tools similar as imaging studies, necropsies, and clinical examinations.

This composition aims to give a comprehensive overview of excrement labels, their types, clinical significance, and limitations, as well as their evolving part in cancer care [3].

### Types of excrement labels

Excrement labels can be classified into several orders based on their characteristics and the types of cancers they're associated with. The most common excrement labels include proteins, enzymes, hormones, and other motes that may indicate the presence of cancer when detected in elevated situations. Below are some of the crucial orders of excrement labels [4].

#### Protein- grounded excrement labels

Proteins are one of the most common types of excrement labels. These proteins are moreover produced by cancer cells or are released in response to the presence of an excrement. Some

of the most extensively studied protein- grounded excrement labels include Carcinoembryonic Antigen (CEA) is a glycoprotein generally elevated in colorectal cancer, but it can also be set up in other cancers similar as lung, bone, and pancreatic cancer [5,6]. While CEA is not specific to cancer, it's used to cover cases with known cancers, especially after treatment, to descry recurrences [6].

Nascence- Fetoprotein (AFP) AFP is a protein primarily used in diagnosing and covering hepatocellular melanoma (liver cancer) and origin cell excrements [7,8]. Elevated situations of AFP can also be observed in other liver conditions, which can occasionally complicate its particularity.

Cancer Antigen 12 (CA- 125) CA- 125 is used to cover ovarian cancer and is elevated in numerous women with ovarian cancer. It's also elevated in other conditions similar as endometriosis, pelvic seditious complaint, and indeed during period, limiting its individual mileage in some cases [9].

Prostate-Specific Antigen (PSA) PSA is a protein produced by the prostate gland, and its elevated situations are frequently associated with prostate cancer [10]. It's used primarily for webbing in men over the age of 50 and for monitoring treatment efficacy.

#### Hormonal excrement labels

Hormones can also serve as excrement labels, particularly for cancers that appear in hormone-sensitive tissue like the bone, ovary, and thyroid [11].

Human chorionic gonadotropin (hCG) is generally elevated in testicular cancer and certain types of gravid trophoblastic complaint, similar as choriocarcinoma. It's also used to cover treatment success and descry rush [11,12].

Estrogen and Progesterone Receptors (ER/ PR) These are proteins set up on the face of some bone cancer cells [13]. Their presence or absence helps determine the type of bone cancer and its implicit response to hormone remedy, similar as tamoxifen or aromatase impediments.

\*Correspondence: Mohamed Hasan, Department of Medicine, Universitas Indonesia, Jakarta, Indonesia. e-mail: [hasanm@ui.ac.id](mailto:hasanm@ui.ac.id)

© 2025 The Author(s). Published by Reseapro Journals. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### Enzyme- grounded excrecence labels

Enzymes are proteins that beget biochemical responses. Some enzymes are produced in advanced amounts by cancer cells, making them useful as excrecence labels. One illustration is Lactate Dehydrogenase (LDH) is an enzyme set up in nearly every cell in the body [5,6]. Elevated LDH situations can be seen in a variety of cancers, including carcinoma, leukemia, and carcinoma. Although LDH can indicate the presence of cancer, its use as a specific excrecence marker is limited.

### Inheritable and molecular excrecence labels

In recent times, the identification of inheritable mutations and molecular labels has become a pivotal part of cancer opinion and treatment. These labels include inheritable mutations, chromosomal abnormalities, and gene expression patterns that give sapience into the type and aggressiveness of cancer [2].

BRCA1 and BRCA2 Mutations in these genes are explosively associated with an increased threat of bone and ovarian cancers. Testing for BRCA mutations is vital for determining cancer threat and guiding preventative strategies, similar as precautionary surgery or targeted curatives [14].

KRAS Mutation Mutations in the KRAS gene are generally set up in cancers similar as colorectal, lung, and pancreatic cancer. KRAS mutations can impact prognostic and determine the most effective treatment strategies, particularly in targeted curatives.

### Clinical operations of excrecence labels

#### Early discovery and opinion

Excrecence labels are particularly precious in the early discovery of certain types of cancer, especially when clinical symptoms may not yet be apparent. For case, elevated PSA situations can suggest the presence of prostate cancer, indeed before physical symptoms manifest. In cases where a specific cancer is suspected, excrecence labels can be used alongside imaging ways (similar as CT reviews, MRIs, or necropsies) to confirm the opinion [10,15].

Still, it's important to note that excrecence labels are infrequently used as the sole individual tool due to their limitations in particularity and perceptivity. For illustration, while an elevated CEA position may raise dubitation for colorectal cancer, it can also be elevated in non-cancerous conditions, similar as seditious bowel complaint or liver cirrhosis. Similarly, excrecence labels should be interpreted in the environment of a case's clinical history and other individual findings [15].

#### Monitoring treatment and disease progression

Tumor labels are essential for covering the effectiveness of cancer treatments and tracking the progression or rush of the complaint. For case, after a case undergoes surgery or chemotherapy, excrecence labels like CEA or CA- 125 may be measured periodically to assess whether the excrecence is responding to treatment or if the cancer has returned [11,16]. In the case of prostate cancer, PSA situations are constantly covered to describe any signs of rush after treatment. A rise in PSA situations after a period of undetectable situations may indicate the emergence of the cancer.

### Prognostic and threat position

Some excrecence labels can give sapience into a case's prognostic. For illustration, high situations of CA- 125 in ovarian cancer may be reflective of a more advanced stage of complaint or poor prognostic. Also, the presence of certain gene mutations similar as BRCA1 or KRAS can help determine how aggressively a cancer may bear and guide treatment opinions [16].

### Limitations of tumor labels

While excrecence labels give precious information, they've several limitations that must be considered lack of particularity numerous excrecence labels can be elevated in non-cancerous conditions. For illustration, CEA is not simply associated with colorectal cancer, and PSA situations may be elevated in benign prostate conditions, similar as benign prostatic hyperplasia [6]. False Cons and Negatives Tumor labels can occasionally produce false-positive results (indicating cancer when it is not present) or false-negative results (failing to descry cancer when it's present). This can be due to variations in how individual cases produce labels or the stage of cancer [16].

Limited perceptivity in Early Stages numerous excrecence labels is not sensible in the early stages of cancer, meaning they may not be effective for screening asymptomatic individuals [3].

### Conclusion

Excrecence labels are an important tool in the early discovery, opinion, treatment monitoring, and prognostic of colorful cancers. While their use is essential in the clinical setting, it's critical to understand their limitations in terms of particularity, perceptivity, and the eventuality for false results. Excrecence labels should always be used in confluence with other individual styles, similar as imaging and necropsies, to insure accurate cancer opinion and case operation. As exploration continues, the discovery of further specific and sensitive excrecence labels may ameliorate cancer care, furnishing better issues for cases through earlier discovery, substantiated treatment strategies, and enhanced monitoring of complaint progression. The part of excrecence labels in cancer care continues to evolve, and as the field advances, these labels will come decreasingly integral to our understanding and operation of this complex complaint.

### Disclosure Statement

No potential conflict of interest was reported by the authors.

### References

1. Babu GS, Supriya AN, Kumar NG, Swetha P. Tumor markers: An overview. *J Orofac Sci*. 2012;4(2):87-95. <https://doi.org/10.1074/mcp.R300006-MCP200>
2. Holdenrieder S, Pagliaro L, Morgenstern D, Dayyani F. Clinically meaningful use of blood tumor markers in oncology. *Biomed Res Int*. 2016;2016(1):9795269. <https://doi.org/10.1155/2016/9795269>
3. Deliu I, Cristina M, Dumitru G. Utility of tumor markers as a diagnostic tool. *Cur Trends Nat Sci*. 2018;7(14):272-275.
4. Sturgeon CM, Lai LC, Duffy MJ. Serum tumour markers: how to order and interpret them. *Bmj*. 2009 339. <https://doi.org/10.1136/bmj.b3527>
5. Wang L, Wang D, Zheng G, Yang Y, Du L, Dong Z, et al. Clinical evaluation and therapeutic monitoring value of serum tumor markers in lung cancer. *Int J Biol Markers* 2016;31(1):80-87. <https://doi.org/10.5301/ijbm.5000177>
6. Reiter MJ, Costello JE, Schwope RB, Lisanti CJ, Osswald MB.

- Review of commonly used serum tumor markers and their relevance for image interpretation. *J Comput Assist Tomogr.* 2015; 39(6):825-834. <https://doi.org/10.1097/RCT.0000000000000297>
7. Batista R, Vinagre N, Meireles S, Vinagre J, Prazeres H, Leão R, et al. Biomarkers for bladder cancer diagnosis and surveillance: a comprehensive review. *Diagnostics.* 2020;10(1):39. <https://doi.org/10.3390/diagnostics10010039>
  8. Banin Hirata BK, Oda JM, Losi GR, Ariza CB, Oliveira CE, Watanabe MA. Molecular markers for breast cancer: prediction on tumor behavior. *Disease markers.* 2014;2014(1):513158. <https://doi.org/10.1155/2014/513158>
  9. Qi W, Li X, Kang J. Advances in the study of serum tumor markers of lung cancer. *J Cancer Res Ther.* 2014;10(Suppl 3):C95-101. <https://doi.org/10.4103/0973-1482.145801>
  10. Luo J, Xiao J, Yang Y, Chen G, Hu D, Zeng J. Strategies for five tumour markers in the screening and diagnosis of female breast cancer. *Front oncol.* 2023;12:1055855. <https://doi.org/10.3389/fonc.2022.1055855>
  11. Wang J. Electrochemical biosensors: towards point-of-care cancer diagnostics. *Biosens Bioelectron.* 2006;21(10):1887-1892. <https://doi.org/10.1016/j.bios.2005.10.027>
  12. Speeckaert MM, Speeckaert R, Delanghe JR. Human epididymis protein 4 in cancer diagnostics: a promising and reliable tumor marker. *Clin Chem.* 2013;59:1-21. <https://doi.org/10.1016/B978-0-12-405211-6.00001-2>
  13. Schiffman JD, Fisher PG, Gibbs P. Early detection of cancer: past, present, and future. ASCO Publications. 2015;35(1):57-65.
  14. Jafari SH, Saadatpour Z, Salmaninejad A, Momeni F, Mokhtari M, Nahand JS, et al. Breast cancer diagnosis: Imaging techniques and biochemical markers. *J Cell Physiol.* 2018;233(7):5200-5213. <https://doi.org/10.1002/jcp.26379>
  15. Xu R, Chi H, Zhang Q, Li X, Hong Z. Enhancing the diagnostic accuracy of colorectal cancer through the integration of serum tumor markers and hematological indicators with machine learning algorithms. *Clin Transl Oncol.* 2024;1-10. <https://doi.org/10.1007/s12094-024-03564-8>
  16. Yang Y, Chang S, Wang N, Song P, Wei H, Liu J. Clinical utility of six serum tumor markers for the diagnosis of lung cancer. *iLABMED.* 2023;1(2):132-141. <https://doi.org/10.1002/ila2.23>