Prostate and lung cancer biomarker detection using biosensors for circulating tumour cells: Trends and prospects.

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Introduction

Cancer cells that have broken out from the original tumour and entered the bloodstream are known as circulating tumour cells (CTCs). They are shed into circulation either directly from the primary tumor or from metastatic sites. CTCs play a crucial role in the spread of cancer throughout the body, known as metastasis [1].

Prostate and lung cancers are two of the most prevalent and lethal types of cancer worldwide. Early detection and effective monitoring of these cancers are critical for improving patient outcomes. Circulating Tumor Cells (CTCs) have emerged as promising biomarkers for cancer diagnosis, prognosis, and treatment response assessment. The detection and analysis of CTCs using biosensors offer a non-invasive and sensitive approach that holds significant potential in prostate and lung cancer management. Prostate cancer is the second most commonly diagnosed cancer among men worldwide, while lung cancer remains the leading cause of cancer-related deaths globally. Traditional diagnostic methods for these cancers often involve invasive procedures and have limitations in terms of sensitivity and specificity. The ability to detect and analyze CTCs using biosensors provides a minimally invasive and real-time approach that can enhance early detection, monitoring, and treatment selection [2].

Biosensors are analytical devices that combine a biological recognition element (e.g., antibodies, aptamers) with a transducer element to convert the biochemical interaction into a measurable signal. In the context of CTC detection, biosensors offer the advantages of high sensitivity, specificity, and rapid detection, allowing for the isolation and characterization of CTCs from complex biological samples such as blood. Various biosensing technologies, including microfluidics, nanomaterials, electrical sensors, optical sensors, and acoustic sensors, have been explored for efficient CTC isolation and detection. These biosensors leverage the unique properties of CTCs, such as their surface markers, size, and biophysical characteristics, to enable their capture and subsequent analysis [3].

The detection and analysis of CTCs have become an active area of research and clinical investigation. Various technologies and methodologies have been developed to isolate and characterize CTCs from blood samples. These methods typically involve enriching the blood sample for CTCs and then analyzing them using different techniques, such as immunocytochemistry, flow cytometry, or molecular profiling.

CTCs can provide valuable insights into several aspects of cancer, including, Early Detection, CTCs can potentially be detected in the bloodstream before a tumor becomes clinically detectable through imaging or other conventional methods. CTCs can be analyzed to determine specific molecular alterations or genetic mutations present in the tumor. This information can guide targeted therapies and help personalize treatment approaches. CTCs offer a means to study the biology and behavior of cancer cells in real-time. They can be used for research purposes to better understand the metastatic process, identify therapeutic targets, and develop new anti-cancer drugs [4].

The use of biosensors for CTC detection in prostate and lung cancers has witnessed significant advancements and holds promising prospects. With continuous technological innovations and integration of multi-dimensional molecular analysis, biosensors have the potential to revolutionize cancer management by providing real-time, non-invasive, and personalized information about tumor dynamics. Biosensor-based CTC detection holds immense potential in the field of prostate and lung cancer biomarker detection. Continued advancements in biosensor technology, combined with standardized protocols and robust clinical validation, will pave the way for its successful integration into routine clinical practice. By providing valuable insights into cancer progression, treatment response, and personalized therapy, biosensors have the potential to significantly improve patient outcomes in prostate and lung cancers [5].

References

1. Pantel K, Alix-Panabières C. Circulating tumour cells in cancer patients: Challenges and perspectives. Trends Mol Med. 2010;16(9):398-406.
2. Qian W, Zhang Y, Chen W. Capturing cancer: Emerging microfluidic technologies for the capture and characterization of circulating tumor cells. Small. 2015;11(32):3850-72.
3. Van de Stolpe A, Pantel K, Sleijfer S, et al. Circulating tumor cell isolation and diagnostics: Toward routine clinical useprogress in circulating tumor cell diagnostics. Cancer Res. 2011;71(18):5955-60.

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4. Kim MY, Oskarsson T, Acharyya S, et al. Tumor self-seeding by circulating cancer cells. Cell. 2009;139(7):1315-26.
5. Doucey MA, Carrara S. Nanowire sensors in cancer. Trends Biotechnol. 2019;37(1):86-99.

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