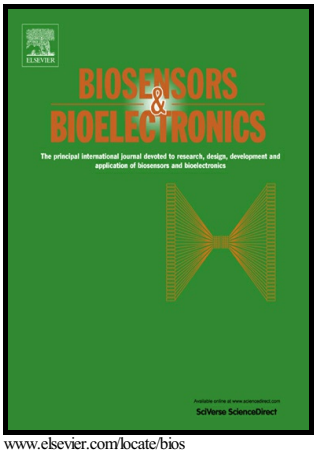

www.elsevier.com/locate/bios

Recent Advances in Biosensor Development for the Detection of Cancer Biomarkers

V.S.P.K. Sankara Aditya Jayanthi, Asim Bikas Das, Urmila Saxena

PII: S0956-5663(16)31242-8
DOI: http://dx.doi.org/10.1016/j.bios.2016.12.014
Reference: BIOS9407

To appear in: *Biosensors and Bioelectronic*

Received date: 28 September 2016
Revised date: 24 November 2016
Accepted date: 7 December 2016

Cite this article as: V.S.P.K. Sankara Aditya Jayanthi, Asim Bikas Das and Urmila Saxena, Recent Advances in Biosensor Development for the Detection o Cancer Biomarkers, *Biosensors and Bioelectronic* http://dx.doi.org/10.1016/j.bios.2016.12.014

Recent Advances in Biosensor Development for the Detection of Cancer Biomarkers

V. S. P. K. Sankara Aditya Jayanthi, Asim Bikas Das, Urmila Saxena*

Department of Biotechnology, National Institute of Technology Warangal, Warangal 506004, Telangana, India
urmila.saxena@gmail.com
urmila@nitw.ac.in
*Corresponding author: Department of Biotechnology, National Institute of Technology Warangal, Warangal 506004, Telangana, India. Tel.: +91 8106811041

Abstract

Cancer is the second largest disease throughout the world with an increasing mortality rate over the past few years. The patient's survival rate is uncertain due to the limitations of cancer diagnosis and therapy. Early diagnosis of cancer is decisive for its successful treatment. A biomarker-based cancer diagnosis may significantly improve the early diagnosis and subsequent treatment. Biosensors play a crucial role in the detection of biomarkers as they are easy to use, portable, and can do analysis in real time. This review describes various biosensors designed for detecting nucleic acid and protein-based cancer biomarkers for cancer diagnosis. It mainly lays emphasis on different approaches to use electrochemical, optical, and mass-based transduction systems in cancer biomarker detection. It also highlights the analytical performances of various biosensor designs concerning cancer biomarkers in detail.

Keywords: cancer, biosensor, biomarker, nanotechnology, diagnosis

1. Introduction

Cancer is a leading life-threatening disease all over the world with over 200 types of cancers identified and more than 1500 deaths occurring each day. In spite of recent technological advancement, the survival rate of cancer patients is still poor because of diagnosis at the late stage and poor prognosis of cancer. The conventional methods, including ultrasound, magnetic resonance imaging, and biopsy are inefficient for early stage cancer detection as these methods depend on the phenotypic properties of the tumor (Altintas et al., 2011). Cancer is a multistage disease, and its onset and progression are associated with a complex array of genetic or epigenetic alterations (Fig. 1) which disturb the cellular signaling and result in tumorigenic transformation and malignancy (del Sol et al., 2010). The molecules