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Review Article

Biomarkers for Hepatocellular Carcinoma

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The hepatocellular carcinoma (HCC) is one of the most common malignant tumors and carries a poor survival rate. The management of patients at risk for developing HCC remains challenging. Increased understanding of cancer biology and technological advances have enabled identification of a multitude of pathological, genetic, and molecular events that drive hepatocarcinogenesis leading to discovery of numerous potential biomarkers in this disease. They are currently being aggressively evaluated to establish their value in early diagnosis, optimization of therapy, reducing the emergence of new tumors, and preventing the recurrence after surgical resection or liver transplantation. These markers not only help in prediction of prognosis or recurrence but may also assist in deciding appropriate modality of therapy and may represent novel potential targets for therapeutic interventions. In this paper, a summary of most relevant available data from published papers reporting various tissue and serum biomarkers involved in hepatocellular carcinoma was presented.

1. Introduction

As molecular indicators of biological status, biomarkers, detectable in blood, urine, or tissue, can be useful for the clinical management of various disease states. Threshold concentrations can be utilized to identify the presence of various diseases. Concentration fluctuations have the potential to guide therapy in disease progression. Numerous biomarkers have been identified for various disease states. Research is ongoing to fully understand and evaluate the clinical significance of utilizing biomarkers. Time and money can be saved by avoiding empiric or broad treatment approaches to diseases of particular organs or systems, and ideally, biomarkers could serve as a measurement tool to detect disease presence and progression and to guide more targeted therapy. Many disease states, especially various types of cancer, can be better understood by the utilization of tumor biomarkers. Hepatocellular carcinoma (HCC) is one such cancer that can benefit from tumor biomarkers' diagnostic, therapeutic, and prognostic capabilities.

HCC is the fifth most common malignant tumor and the third leading cause of cancer-related deaths. Worldwide, there are about 626,000 new HCC cases and nearly 600,000 HCC-related deaths each year with an incidence equal to the death rate [1, 2]. Although the molecular mechanisms by which HCC develops remain largely unclear, a multitude of pathological, genetic, and molecular events that drive hepatocellular carcinogenesis has been identified.

Current gold standard and most commonly used biomarkers for patients at risk for HCC, alpha-fetoprotein (AFP) along with ultrasound every 6 to 12 months, is far from perfect. Serum AFP levels of more than 400 ng/mL are considered diagnostic; however, such high values are observed only in a small percentage of patients with HCC. Ultrasound surveillance even performed at every three monthly intervals cannot improve detection of small HCC because of limitations in recall procedures [3, 4].

With advances in understanding of tumor biology, along with the development of cellular and molecular techniques, the role of biomarkers related to early detection, invasiveness,