Liver Cancer

Detection of Hepatocellular Carcinoma Cases Using a Multiplex Cancer Biomarker Panel

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Abstract

Hepatocellular carcinoma (HCC) is the fourth leading cause of cancer-related mortality worldwide with an annual survival rate of only 15% in the United States. The age-adjusted incidence of HCC in the United States is 3.1 per 100,000 in men and 1.7 per 100,000 in women. While early diagnosis is key to the best outcomes, the diagnosis can be challenging as patient symptoms may be nonspecific. In this study, we evaluated 10 tumor markers for their utility in distinguishing HCC from cirrhosis and normal samples.

Methods

Meso Scale Discovery technology uses 5,570-Plex technology that has high light sensitivity. Sensitive detection is enhanced by electrochemiluminescence, high sensitivity and low detection thresholds. The assay platform is based on a sandwich immunoassay format and utilizes antibodies labeled with acridinium esters. Sensitivity is improved due to high signal-to-background ratios and low detection thresholds. Antibodies are chosen to provide high specificity and high sensitivity.

Performance of Individual Biomarkers

The data for the top 4 markers (AFP, CA 19-9, CA 125, CEA) were also used to derive scores of normalized mean differences between the 3 groups of samples to determine the relative specificity of the biomarker in distinguishing the groups. The scores were derived using a method described by Bland and Altman (1999). The data were analyzed using a one-way ANOVA. The differences were then compared using the Tukey-Kramer test. The data for the top 4 markers (AFP, CA 19-9, CA 125, CEA) were also used to derive scores of normalized mean differences between the 3 groups of samples to determine the relative specificity of the biomarker in distinguishing the groups. The scores were derived using a method described by Bland and Altman (1999). The data were analyzed using a one-way ANOVA. The differences were then compared using the Tukey-Kramer test.

Conclusion

The preliminary study indicates the levels of several classic cancer-associated markers in HCC patient sera were elevated in levels beyond normal individuals and patients with benign liver disease (cirrhosis). The scores show that CA 19-9 and CA 19-9 serum levels are significantly elevated in HCC patients compared to normal controls. Furthermore, combining CA 19-9 with other markers may provide a higher degree of specificity than is possible using individual markers. These observations must be corroborated by additional studies using larger clinical sample sets.