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Identification of diagnostic serum protein profiles of glioblastoma patients.

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Abstract

Diagnosis of a glioblastoma (GBM) is triggered by the onset of symptoms and is based on cerebral imaging and histological examination. Serum-based biomarkers may support detection of GBM. Here, we explored serum protein concentrations of GBM patients and used data mining to explore profiles of biomarkers and determine whether these are associated with the clinical status of the patients. Gene and protein expression data for astrocytoma and GBM were used to identify secreted proteins differently expressed in tumors and in normal brain tissues. Tumor expression and serum concentrations of 14 candidate proteins were analyzed for 23 GBM patients and nine healthy subjects. Data-mining methods involving all 14 proteins were used as an initial evaluation step to find clinically informative profiles. Data mining identified a serum protein profile formed by BMP2, HSP70, and CXCL10 that enabled correct assignment to the GBM group with specificity and sensitivity of 89 and 96%, respectively ($p < 0.0001$, Fischer's exact test). Survival for more than 15 months after tumor resection was associated with a profile formed by TSP1, HSP70, and IGFBP3, enabling correct assignment in all cases ($p < 0.0001$, Fischer's exact test). No correlation was found with tumor size or age of the patient. This study shows that robust serum profiles for GBM may be identified by data mining on the basis of a relatively small study cohort. Profiles of more than one biomarker enable more specific assignment to the GBM and survival group than those based on single proteins, confirming earlier attempts to correlate single markers with cancer. These conceptual findings will be a basis for validation in a larger sample size.

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