Urinary Prosaposin and Thrombospondin as Diagnostic Biomarkers in Medulloblastoma

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Introduction

Urinary biomarkers have been used in our laboratory as a novel, non-invasive method to diagnose disease of the central nervous system, including tumors, stroke and moyamoya. Here we present the use of urinary levels of prosaposin and thrombospondin-1 as a novel biomarker pair capable of detecting the presence of medulloblastoma.

Methods

Urine was collected from 95 pediatric patients (0-18 years of age), focusing on those with medulloblastoma (n=11, as confirmed by both imaging and subsequent surgical pathology) and compared to other brain tumor and cerebrovascular disease groups (n=67), in addition to age- and sex-matched controls (n=17), following an IRB approved protocol. Tumor size, location and Chang score were evaluated. ELISA was used to quantify the levels of urinary prosaposin and thrombospondin-1 and data was normalized to protein concentration using Bradford assays. Cerebrospinal fluid (CSF) was also evaluated, along with tissue subjected to immunohistochemistry. Results were subjected to univariate and multivariate statistical analyses.

Results

Evaluation of prosaposin and thrombospondin-1 as urinary biomarkers by ELISA showed statistically significant, clinically relevant differences in samples from patients with medulloblastoma as compared to controls ($p<0.05$). In addition, prosaposin/thrombospondin -1 ratios were predictive of the presence of medulloblastoma and distinct from other CNS pathologies.

Conclusions

Prosaposin and thrombospondin-1 demonstrate the potential role of urinary biomarkers in diagnosing medulloblastoma. These biomarkers correlate not only with presence of disease but also distinguished medulloblastoma from other CNS pathologies. These data support the hypothesis that the use of urinary biomarkers may have utility as a novel, noninvasive method to identify medulloblastoma in children.

Learning Objectives

By the conclusion of this session, participants should be able to:

1) Describe the importance of urinary biomarkers as novel diagnostic tools.

2) Discuss, in small groups, the advantages and shortcomings of non-invasive methods of brain tumor diagnosis and follow-up.

3) Identify an effective panel of molecules able to assist in the diagnosis of central nervous system disease.

References

Smith ER, Zurakowski D, Saad A, Scott RM, Moses MA.

Urinary biomarkers predict brain tumor presence and response to therapy.

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