Plasma Periostin is a Potential Diagnostic Biomarker for Malignant Pleural Mesothelioma

Objective: Periostin (POSTN) has been described as a prognostic and immunomodulatory extracellular matrix protein associated with mesenchymal differentiation in malignant pleural mesothelioma (MPM). We evaluated whether (1) plasma POSTN levels could be used as a sensitive and specific biomarker for MPM diagnosis and prognosis and (2) whether these characteristics could be externally validated validate using blinded cohorts.
Methods: We measured differential gene expression between matched tumor and peritoneum specimens from 37 patients having extrapleural pneumonectomy for MPM using the Affymetrix GeneChip® Human Exon 1.0 ST array. POSTN secretion was measured using a commercially available ELISA (Aviscera, Santa Clara, CA) from 3 lung cancer and 8 MPM cell lines along with a normal bronchial epithelial cell line (BEAS2B) and a tert transformed mesothelial cell line (LP9). POSTN plasma levels were investigated in (1) a discovery set of 38 MPMs vs 17 asbestos exposed individuals (AE) (2) a validation set of 106 MPMs and 91 AE pipe fitters (3) and a blinded external validation set of 33 MPMs and 34 AEs from a National Institute for Occupational Safety & Health grant-supported SuperFund cohort. Additionally, POSTN plasma levels were compared between 106 MPMs and 54 non MPM presenting with benign or malignant pleural effusions. The Area (AUC) under the Receiver operating curves (ROC) defined differences between case and control cohorts.
Results: Gene expression of POSTN in matched tumor and peritoneum specimens from 37 patients having extrapleural pneumonectomy revealed two-fold elevation of POSTN message in the tumor ($p=4.5x10-11$). POSTN media levels were significantly elevated in all MPM cell lines vs LP9 ($p<0.001$) and were significantly higher than that seen in lung cancer cell lines ($p<0.05$). Mean POSTN plasma levels for MPM were significantly higher than those of AE (883+40 vs 229+10 ng/ml, mean + SE, $p<0.0001$). As seen in Table 1, POSTN could separate MPM from AE significantly in all cohorts including a blinded validation; however, prospective studies to determine the optimal cut-point criterion must be performed. Moreover, plasma POSTN can also separate patients who present with non meso pleural effusions. Plasma POSTN was unable to separate patients who survived longer than 2 years from those who did not.
Conclusions: Preliminary data for POSTN as a diagnostic biomarker for MPM is encouraging. Further prospective studies for validation of these findings are necessary to define proper cut points which define the risk of MPM development in high-risk populations as well as to accurately diagnose new onset pleural effusions.

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Additional Resources

- https://files.aievolution.com/prd/aat2101/abstracts/abs_2260/Table1POSTN.docx