Differential Expression of Immune-Regulatory Protein on Peripheral Blood Mononuclear Cells in Advanced Stage Non-Small Cell Lung Cancer Patients

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Background: An accurate diagnostic biomarker for identifying early stage non-small cell lung cancer (NSCLC) is essential to improve the treatment outcome and reduce mortality. Peripheral blood mononuclear cell (PBMC) have been shown to offer potential information related to the presence of disease, including prognosis and treatment response. Recent studies have reported the feasibility of using PBMC gene expression signature for early detection of cancer. In this study, we investigated whether immune-related protein expression on PBMC could discriminate between patients with and without NSCLC.

Methods: This study was divided into three phases: (1) candidate protein discovery using available published data on RNA expression on PBMC in NSCLC patients; (2) protein selection and validation by immunofluorescence staining on PBMC from patients with advanced stage NSCLC, along with PBMC from healthy individuals as controls; and (3) independent validation using flow cytometry on a set of PBMC from 30 patients with advanced stage NSCLC and 30 healthy controls.

Results: Of the panel of 5 immune-related proteins analyzed (CLEC4A, CLEC4D, C5AR1, NLRP3, and S100A12), we have observed the significantly increased expression of CLEC4A, CLEC4D and NLRP3 in NSCLC group. Using the same threshold, mean fluorescence intensities of specific-antibody staining on CD3+ lymphocytes in NSCLC patients compared with non-cancer individuals were 810.06  428.4 vs 698.38  344.0, 1,091.52  522.5 vs 916.02  454.4 and 1,030.49  458.6 vs 742.95  203.5 for CLEC4A, CLEC4D and NLRP3, respectively (p < 0.001). On the contrary, the expression of C5AR1 and S100A12 were decreased in NSCLC when compared to control group [919.67  256.6 vs 1,428.75  407.0 (p < 0.001) and 2,219.30  327.0 vs 2,502.44  429.5 (p=0.03), respectively].

Conclusions: Diverse immune-related protein expressions on PBMC between NSCLC patients and healthy control could be a potential non-invasive strategy of lung cancer detection in the future.