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CD157 as a potential pleural effusion biomarker for malignant mesothelioma

Simona Morone[1], Stefania Capano[1], Alice Giacomino[1], Stefania Augeri[1], Erika Ortolan[1], Ida Rapa[2], Luisella Righi[2] and Ada Funaro[1].
Departments of [1]Medical Sciences and [2]Oncology, University of Torino, Italy.

Introduction. Malignant pleural mesothelioma (MPM) is a deadly cancer, which is difficult to diagnose because of nonspecific clinical symptoms. Since most patients with MPM present with pleural effusion (PE), cytological examination is routinely adopted to identify malignant cells for diagnostic purpose. However, cytology has an average sensitivity of only 30–50 % in MPM. Hence, the measurement of biomarkers in PE can play a meaningful role in the diagnosis of MPM.
CD157 glycoprotein was found in the most common types of MPM and its expression levels were associated with exacerbated tumor aggressiveness. In this study we explored the existence of soluble CD157 in PE and evaluated its potential clinical utility as biomarker in MPM patients.
Materials and Methods. CD157 expression was analysed by western blot and its levels were measured by an enzyme-linked immunosorbent assay in the culture medium from non-malignant and malignant mesothelial cell lines and in 303 consecutive patients who had developed PE: 56 PE were from MPM, 170 from other tumors and 133 from benign thoracic diseases.
Results and Discussion. We demonstrated that CD157 is released both in vitro and in vivo either by normal or neoplastic mesothelial cells. CD157 can be shed from the cell membrane by proteolytic cleavage and as exosome-anchored protein. In PE from patients with MPM we found significantly higher levels of sCD157 than in those from patients with lung cancer ($P=0.0001$) or other tumors ($P=0.0095$), as well as in those from patients with benign pathologies ($P <0.0001$), suggesting that PE sCD157 levels could serve as a biomarker for MPM in the differential diagnostic settings. sCD157 evaluation has proven to make a valuable contribution to the diagnosis of MPM in 50% of cytology-negative cases, whereas in the setting of inconclusive effusion cytology, sCD157 had a positive predictive value for MPM of 84.6%. Overall, measurement of sCD157 in combination with cytology evaluation allowed to formulate diagnosis of mesothelioma in 76.8% of patients from a single PE sample.
sCD157 levels resulted below the cut-off value in 5/21 cases of cytology-positive MPM, and sCD157-positive samples were found in PE due to other tumors or benign pathologies, indicating that sCD157 cannot be regarded as a diagnostic tool by itself.
Conclusion. This study showed that sCD157 detection in PE may be a way to significantly improve the clinical impact of effusion-based MPM diagnosis limiting diagnostic delay.