

## Nanomaterials in tumor immunology: Friends or foes?

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Cellular and molecular interactions within the tumor microenvironment play the key role in regulating the tumor growth and progression, as well as in tumor response to therapy. The use of Nano vehicles for drug delivery is a promising and widely investigating approach to cancer therapy. However, the behavior of nanomaterials and carried chemotherapeutic agents in the local tumor micro environmental conditions has not been investigated. Using murine lung cancer model, we demonstrated for the first time that aspiration of nanomaterials altered the lung microenvironment and accelerated in growth of lung carcinoma cells. The pro-tumorigenic effect of exposure to nanotubes was mediated by myeloid derived suppressor cells (MDSC) and TGF- $\beta$ , as depletion of MDSC and the absence of the TGF- $\beta$  signaling significantly abrogated tumor stimulating effect of nanomaterials. We have also revealed that chemotherapeutic agents, such as doxorubicin can lose the antitumor activity in the myeloperoxidase catalyzed and peroxynitrite mediated oxidative conditions reflecting the activity of tumor activated MDSC. Our data also suggests that the chemotherapeutic agents delivered by the nanocarrier, which constitutes an oxidized single walled nanotube and a branched phospholipid polyethylene glycol, may be protected from the enzymatic inactivation associated with myeloid cells in the tumor microenvironment while exhibiting the constant doxorubicin release rate. Additional development of Nano delivery system allowed generating unique carbon nanotube cups, i.e., nanoscale containers that can be loaded with chemotherapeutic agents corked with gold nanoparticles and be opened by MDSC derived myeloperoxidase catalyzed reactive intermediates and sodium hypochlorite. This results in local release of chemotherapeutic drugs in the MDSC enriched microenvironment, i.e., the tumor milieu and effective inhibition of MDSC activity. Thus, understanding the biology of myeloid regulatory cells in the tumor microenvironment opens new opportunity for development of effective and controllable nanocarrier for safe delivery of therapeutic agents to the tumor site.

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## The evaluation of concentration of calprotectin, in pleural fluid with causes of exudative pleural effusion

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**Background:** Nowadays, routine invasive techniques to diagnose the causes of exudative pleural effusion are going to be replaced by new noninvasive methods such as biomarkers which with the same diagnostic accuracy can confirm malignant situations at least in a group of cases who do not need more invasive means.

**Materials & Methods:** In this descriptive-analytical and case control study, the calprotectin concentrations in pleural fluid was evaluated in 90 patients with exudative pleural effusion, and compared among two groups Including 34 patients with malignant pleural effusion (MPE) and 56 patients with benign pleural effusion (BPE) in sayyad shirazi hospital in Gorgan of Iran in 2014. All patients underwent examination and the necessary laboratory tests were done and Closed pleural biopsy was performed if necessary. Collected Data were analyzed by SPSS-21<sup>st</sup> statistical software and chi-square, t-test, ANOVA and logistic regression analysis.

**Results:** Calprotectin concentration was ( $107.72 \pm 10.59$ ) in patients with malignant cause and ( $114.42 \pm 23.95$ ) in others. Calprotectin concentration was ( $122.34 \pm 27.03$ ) in patient with TB. The results showed that this difference was statistically significant ( $p=0.05$ ) and calprotectin rate, is lower in the malignant pleural effusion. Especially, when the results were compared with patients with TB, this difference was more prominent ( $p=0.01$ ).

**Discussion & Conclusion:** According to higher levels of calprotectin in tuberculous pleural effusions, maybe we can achieve important results in differentiating between malignant and non-malignant pleural exudate, without the need for invasive procedures, by putting together the clinical symptoms, the calprotectin concentration in pleural fluid and pleural fluid cytology results.

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