The anti-inflammatory role of myeloid-derived suppressor cells in asthma in vivo

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Abstract

Myeloid-derived suppressor cells (MDSCs) are innate immune cells characterized by their potential to control T-cell responses and to dampen inflammation. While the role of MDSCs in cancer has been studied in depth, our understanding of their relevance for lung inflammatory disease conditions has just begun to evolve. We aimed to characterize MDSC accumulation and function in allergic airway inflammation. Allergic airway inflammation was induced in mice by ovalbumin (OVA) and house dust mite (HDM) challenge. Two days before and on the day of final OVA antigen challenge or on the last day of HDM challenge, mice were subjected to intravenous (IV) or intratracheal (IT) injection of PMN-MDSCs. The distribution and function of MDSCs in mice was analyzed. In an OVA-induced murine asthma model, the number of PMN-MDSCs was significantly decreased in bronchoalveolar lavage fluid (BALF) and lungs. IV or IT injected PMN-MDSCs were significantly recruited to the lungs and BALF of asthmatic mice. PMN-MDSCs transferred into asthmatic mice via IV or IT injection suppressed the infiltration and activity of Th2 and Th17 inflammatory cells in lungs of asthmatic mice. Th2 and Th17 cytokines release was also diminished after PMN-MDSCs transfer via IV or IT route. Histopathological examination confirmed reduction of PAS-positive cell number and inflammation score in lung of asthmatic mice after treatment with MDSCs. Our results showed that MDSCs suppress Th2-dominant inflammation in asthmatic mice. Adoptive cellular transfer of PMN-MDSCs may represent an attractive therapeutic strategy to dampen immune responses in Th2 driven inflammatory settings in lungs, as found in allergic asthma.