GiC XXXIX WEB CONFERENCE 14 - 18 GIUGNO 2021
CONFERENZA NAZIONALE DI CITOMETRIA
AGGIORNAMENTI E INNOVAZIONI DELLA CITOMETRIA NELLE APPLICAZIONI CLINICHE E DI RICERCA

PHENOTYPIC AND FUNCTIONAL HETEROGENEITY OF LOW-DENSITY AND HIGH-DENSITY HUMAN LUNG MACROPHAGES

Scalia G.[5], Balestrieri B.[1], Granata F.[1,2], Petraroli A.[1,2], Massimo Triggiani [7], Stefania Loffredo [1,2, 3,4].

1. Department of Translational Medical Sciences, University of Naples Federico II, 80131 Naples, Italy; stefanialoffredo@hotmail.com (S.L.); petrarol@unina.it (A.P.); frapagra@hotmail.com
2. Center of Excellence, World Allergy Organization (WAO), 80131 Naples, Italy
3. Center for Basic and Clinical Immunology Research (CISI), University of Naples Federico II, 80131 Naples, Italy
4. Institute of Experimental Endocrinology and Oncology (IEOS), National Research Council, 80131 Naples, Italy
5. Clinical and Experimental Cytometry Unit, CEINGE-Biotecnologie Avanzate, 80131 Naples, Italy; scalia@ceinge.unina.it
7. Division of Allergy and Clinical Immunology, University of Salerno, 84084 Fisciano (SA), Italy; mtriggiani@unisa.it (M.T.)

Abstract: Background: Pulmonary macrophages are a highly heterogeneous cell population distributed in different lung compartments.
Methods: We separated two subpopulations of macrophages from human lung parenchyma according to flotation over density gradients.
Results: Two-thirds 65.4% of the lung macrophages have a density between 1.065 and 1.078 (high-density macrophages: HDMs), and the remaining one-third (34.6) had a density between 1.039 and 1.052 (low-density macrophages: LDMs). LDMs had a larger area (691 vs. 462 _m2) and cell perimeter (94 vs. 77 _m) compared to HDMs. A significantly higher percentage of HDMs expressed CD40, CD45, and CD86 compared to LDMs. In contrast, a higher percentage of LDMs expressed the activation markers CD63 and CD64. The release of TNF-α, IL-6, IL-10 and IL-12 induced by lipopolysaccharide (LPS) was significantly higher in HDMs than in LDMs.
Discussion: The human lung contains two subpopulations of macrophages that differ in buoyancy, morphometric parameters, surface marker expression and response to LPS. The density distribution of lung macrophages is clearly bimodal on continuous gradients and it is maintained during short-term culture in vitro.
Conclusion: These subpopulations of macrophages probably play distinct roles in lung inflammation and immune responses. Our study shows that LMDs and HDMs produce different amounts of cytokines upon activation with the same stimulus. In fact, LPS-stimulated HDMs produce significantly higher levels of classical proinflammatory cytokines (i.e., IL-6 and TNF- α) compared to LDMs. This difference is even more marked in the case of the immunoregulatory cytokines IL-10 and IL-12. These observations support the concept that differences in the intensity rather that the quality of the response to LPS is a feature of the two subpopulations of human lung macrophages.