Expression of TCR, but not of CD3, on human macrophages is dependent on Mycobacterium tuberculosis virulence

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Introduction. Macrophages are essential for the activation of immune responses against Mycobacterium tuberculosis (Mtb). Recently two new subpopulations of CD3+ myeloid cells have been described: a smaller one which co-expresses the T cell receptor (CD3+TCRab+) and a larger one which does not (CD3+TCRab-). Both subpopulations increase after mycobacterial infection by a tumor necrosis factor (TNF)-dependent pathway. We investigated if a virulent strain of Mtb (H37Rv) induces a stronger presence of CD3+TCRab+ and CD3+TCRab- macrophages compared to an avirulent strain (H37Ra). Materials and Methods. CD14+ cells were purified from healthy donors and differentiated to macrophages (MDM). MDM were infected with either H37Rv (MOI 1 and 5) or H37Ra (MOI 1 and 10). Cells were recovered for phenotype assessment by flow cytometry, while supernatants were tested for a proinflammatory profile using ELISA. Results. Both strains induced a similar frequency of CD3+ MDM. Interestingly, while H37Rv increased the frequency of CD3+TCRab+ MDM at a low MOI, H37Ra required a high MOI. Indeed, Mtb virulence had opposite effects on the two MDM subpopulations: while H37Rv decreased the frequency of CD3+TCRab-HLA-II+, CD3+TCRab+CD1b+ and CD3+TCRab-tmTNF+ MDM, H37Ra increased the frequency of CD3+TCRab-CD1b+, CD3+TCRab-CD1c+ and CD3+TCRab-tmTNF+ MDM. Finally, MDM infected with H37Rv delivered high levels of IL-10, IFN-g, IP-10 and TNF even at a low MOI, while H37Ra was able to induce a high level of IL-10 and TNF only at high MOI. Conclusion. Virulence of Mtb can modify the profile of macrophage subpopulations. H37Rv increases the frequency of CD3+TCRab+ MDM and decreases CD3+TCRab- MDM. Further study of these new macrophage subpopulations could unravel new alternatives to active an effective immune response to Mtb bacilli.

Keywords : macrophages, tuberculosis, CD3, TCR
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