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Molecular differences of NLRP3 inflammasome activation in LPS-activated human monocyte-derived macrophage subtypes

Marietta M. Budai[1], Judit Danis[1], Ágnes Becsei[1], Aliz Varga[1], László Csernoch[1], József Tőzsér[2] and Szilvia Benkő[1*]

- [1] University of Debrecen, Medical and Health Science Center, Faculty of Medicine, Department of Physiology, Hungary
- [2] University of Debrecen, , Medical and Health Science Center, Faculty of Medicine, Department of Biochemistry and Molecular Biology, Department of Biochemistry and Molecular Biology, Hungary

IL-1beta is a “master” cytokine that has indispensable roles in orchestrating effective innate and adaptive immune responses.
It is produced in an inactive precursor form that is cleaved to active cytokine by protein complexes called Nlrp3 inflammasomes (1). While our knowledge on the general mechanisms involved in Nlrp3 inflammasome function and on its regulation is rapidly increasing, it is also getting clear that the actual outcome of the activation (like IL-1beta production) strongly depends on the cell type and on the presence or absence of various intracellular or extracellular modulators (2). Depending on their localization macrophages can develop into a wide range of phenotypes. Macrophages differentiated in the presence of GM-CSF (GM-MFs) develop inflammatory phenotype, while cells differentiated in the presence of M-CSF (M-MFs) possess anti-inflammatory characteristics and function in wound healing and tissue repair.
Our results show that following LPS treatment GM-MFs produce high IL-1beta, while M-MFs produce
low IL-1beta with a different time- and concentration kinetics. We found significant differences in basal and LPS-induced expression of Nlrp3, procaspase-1 and ASC between the two MF types. We found that LPS-treated GM-MFs are able to release ATP and produce IL-1beta, while M-MFs require ATP supplementation for IL-1beta secretion. We have also found expression differences in the proteins responsible for ATP release, recognition and degradation as well as in the activation of key signal transduction pathways. Furthermore, we will show that different nucleosides have strong and differential regulatory effects of NLRP3 inflammasome function.

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* Correspondence: Dr. Szilvia Benkő, University of Debrecen, Medical and Health Science Center, Faculty of Medicine, Department of Physiology, Debrecen, H-4012, Hungary, szbenko@gmail.com