

Microbial Diversity 2019

Microbial diversity as a source of novelty: function, adaptation and exploitation MD2019

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Published by SIMTREA, Società Italiana di Microbiologia Agro-Alimentare e Ambientale, San Casciano Val di Pesa, Firenze, Italy.

ISBN 978-88-943010-1-4

www.simtrea.org

Immunomodulation of murine macrophages J774.1 by *Lactobacillus plantarum* strains isolated from the human gastrointestinal tract and fermented foods

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Introduction: Probiotic bacteria are known to exert beneficial effects on different physiological processes in the host. Among these properties, one of the most studied is their capacity to modulate the immune system. In this regard, bacteria belonging to the genus *Lactobacillus* have been demonstrated to have an immunomodulatory effect. Furthermore, several in vitro and in vivo studies have supported that this activity is exerted in a strain-specific manner. However, mechanisms underlying the effect of these bacteria on the immune system remain to be elucidated. The main objective of this study was to investigate the ability of three *Lactobacillus plantarum* strains isolated from different sources (*Lb. plantarum* IMC 513® (Synbiotec s. r. l., isolated from human gastrointestinal tract), *Lb. plantarum* C9O4 (isolated from table olives), and *Lb. plantarum* LT52 (isolated from raw-milk cheese) on the modulation of the immune response of a murine macrophage-like cell line (J744.1).

Materials and Methods: For that purpose, cells were first pretreated with the three different *Lb. plantarum* strains for 4 hours alone or in association with lipopolysaccharide (LPS) as an inflammatory stimulus. The expression of a panel of genes involved in the immune response, including pattern-recognition receptors genes TLR2, and TLR4, and cytokine genes TNF- α , IFN-g, IL-1 β , IL-6, and IL-10 was evaluated by RT-qPCR.

Results: Our data showed that the three strains of *Lb. plantarum* were able to modulate the expression of genes involved in the immune response, with the induction of IL-6 and TNF- α and the reduction of INF-g, TLR-2, and TLR-4 mRNA levels when cells were exposed to an inflammation stimulus.

Our results report that the three *Lb. plantarum* strains evaluated are able to modulate the expression of pro and anti-inflammatory genes in J774.1 cells and thus to potentially modulate the inflammation process. Moreover, the finding that *Lactobacillus* strains regulate the expression of genes encoding pattern-recognition receptors suggests a mechanism for profound homeostatic control at an early stage of the immune inflammatory response.

Conclusions: Our results also highlighted nuances between the individual bacterial strains, suggesting that the immunoregulatory effects of lactobacilli are strain-dependent. These promising results will be further confirmed through the analysis of protein expression and preliminary data from further in vitro and in vivo experiments will be here presented.