

LIPOTEICHOIC ACID AND MURAMIC ACID MODULATE THE EXPRESSION OF CD80/CD86 ON THP-1 CELLS AND CD28/CD152 ON JURKAT CELLS

M. Galdiero¹, M.G. Pisciotta², G. Petrillo¹, A. Marinelli³, E. Galdiero⁴

¹Dipartimento di Medicina Sperimentale, Sezione di Microbiologia, Facoltà di Medicina e Chirurgia, Seconda Università degli Studi di Napoli;

²Dipartimento di Patologia Generale, Facoltà di Medicina e Chirurgia, Seconda Università degli Studi di Napoli;

³Dipartimento di Medicina Pubblica e Preventiva, Facoltà di Medicina e Chirurgia, Seconda Università degli Studi di Napoli;

⁴Dipartimento di Fisiologia Generale, Sezione di Igiene e Microbiologia, Università degli Studi di Napoli "Federico II"

SUMMARY

The aim of this study is to evaluate the effect of lipoteichoic acid (LTA) and muramic acid (MA) on costimulatory molecules CD80/CD86 on THP-1 cells and CD28/CD152 on Jurkat cells. The interactions between these molecules strongly influence the immune response through the regulation of cytokine release which, on its own, is able to regulate the immunological response by a feedback mechanism. Our results show that LTA and MA regulate expression of CD86 on macrophages while the expression of CD80 remains unmodified. LTA and MA increase the expression of CD86 on THP-1 cells, a macrophage cell line. MA increased Jurkat T cells CD152 expression.

KEY WORDS: Lipoteichoic acid, muramic acid, CD80/CD86, CD28/CD152, THP-1 cells, Jurkat cells

Received February 28, 2004

Accepted May 13, 2004

INTRODUCTION

The cell wall of Gram-positive bacteria contains lipoteichoic acid (LTA) and peptidoglycan (PepG). LTA is an amphiphilic molecule equivalent to lipopolysaccharide (LPS) of Gram-negative bacteria, containing a substituted polyglycerophosphate backbone attached to a glycolipid. PepG is a polymer of N-acetylglucosamine (NAG) and N-acetylmuramic acid (NAM) that is highly cross-linked by peptide bridges. A number of studies have shown that LTA exhibits several biological properties comparable to those of LPS of Gram-negative bacteria (Knox and Wicken, 1973), including immunogenicity, mitogenicity, bone resorption, stimulation of alternative pathway of complement, Schwartzman

reaction, hypersensitivity, stimulation of non specific immunity, release of cytokines, nephrotoxicity and adjuvant activity. In PepG, the muramic peptide fragment possesses the same biological activities as the whole molecule. Kengatharan *et al.* have shown that a specific fragment of PepG, namely N-acetylglucosamine-beta-[1→4]-N-acetylmuramyl-L-alanine-D-isoglutamine, is the moiety within the PepG polymer responsible for the synergism with LTA to induce nitric oxide (NO) formation in macrophages (Kengatharan *et al.*, 1998). Thus it has been proposed that PepG may amplify the response induced by LTA. In addition, LTA is involved as an antigen stimulating specific response. Also peptidoglycan is a fundamental component of the bacterial cell wall and is thus