Available online at www.sciencedirect.com
SCIENCE DIRECT®
Progress in Lipid Research 44 (2005) 259–302
Progress in Lipid Research
www.elsevier.com/locate/plipres

Review

The dimycocerosate ester polyketide virulence factors of mycobacteria

Kenolisa C. Onwueme [a,b,*], Cheryl J. Vos [b], Juan Zurita [b], Julian A. Ferreras [b], Luis E.N. Quadri [b,*]

[a] *Cornell/Rockefeller/Sloan-Kettering Tri-Institutional MD-PhD Program, New York, NY 10021, USA*
[b] *Department of Microbiology and Immunology, Weill Medical College of Cornell University, New York, NY 10021, USA*

Abstract

Recent advances in the study of mycobacterial lipids indicate that the class of outer membrane lipids known as dimycocerosate esters (DIMs) are major virulence factors of clinically relevant mycobacteria including *Mycobacterium tuberculosis* and *Mycobacterium leprae*. DIMs are a structurally intriguing class of polyketide synthase-derived wax esters discovered over seventy years ago, yet, little was known until recently about their biosynthesis. Availability of several mycobacterial genomes has accelerated progress toward clarifying steps in the DIM biosynthetic pathway and it is our belief that reviewing the bases of our current knowledge will clarify outstanding issues and help direct future endeavors.

Abbreviations: ACP, acyl carrier protein; AT, acyltransferase; CFU, colony forming unit; dextro, dextrorotatory; DIM, dimycocerosate ester; dPGL, deacylated phenolic glycolipid; DH, dehydratase; ER, enoyl-ACP reductase; hyg, hygromycin; km, kanamycin; KR, ketoreductase; KS, keto-acyl ACP synthase; levo, levorotatory; MalCoA, malonyl CoA; MeMalCoA, methyl malonyl CoA; Mbov, *Mycobacterium bovis*; Mgas, *M. gastri*; Mhae, *M. haemophilum*; Mkan, *M. kansasii*; Mlep, *M. leprae*; Mmar, *M. marinum*; Mtb, *M. tuberculosis*; Mulc, *M. ulcerans*; MYCS, mycocerosic acids; PDIM, phthiocerol dimycocerosate; PGL, phenolic glycolipid; PCOL, phthiocerol; ϕPCOL, phenolphthiocerol; PDON, phthiodiolone; PTOL, phthiotriol; SAM, S-adenosyl methionine; STM, signature tagged mutagenesis; wt, wild-type.

* Corresponding authors. Tel.: +1 212 396 1100; fax: +1 212 746 8678 (K.C. Onwueme), Tel.: +1 212 746 4497; fax: +1 212 746 4028 (L.E.N. Quadri).
E-mail addresses: kco2001@med.cornell.edu (K.C. Onwueme), leq2001@med.cornell.edu (L.E.N. Quadri).

0163-7827/$ - see front matter © 2005 Elsevier Ltd. All rights reserved.
doi:10.1016/j.plipres.2005.07.001

Contents