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Lysine decarboxylase: a new bacterial target for drug development to control Gingivitis

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Abstract

Gingival inflammation (gingivitis) is mediated by dentally adherent bacterial biofilms at gingival margins. The biofilms extend apically into the periodontium, causingchronic periodontitis which associates with cardiovascular diseaseand diabetes (Am J Epidemiol. 177:700-707, 2013). Gingivitisis controlled by tooth cleaning supplemented with non-specific anti-bacterial agentsthat promote bacterial resistance, fungal infections,and tooth staining(J ClinPeriodontol, 34:58-65, 2007). *Eikenella corrodens* in dental biofilmsproduces lysine decarboxylase (LDC) which impairsthe epithelial barrier to pro-inflammatory bacterial products by converting essential lysine to cadaverine (J Periodontol, 83:1048-1056, 2012). Antibodies that inhibitLDC retard gingivitis development in beagle dogs (Vaccine, 30:6706-6712, 2012).Tranexamic acid (TA) isa lysine analog thatinhibits fibrinolysis by preventing plasminogen activation. TA inhibitedLDC800-times less effectively than it inhibits plasminogen activator (LDC dissociation constant, Ki=1.65 mM). Compared with no TA after oral hygiene restriction (OHR)for a week, cadaverine was decreased in biofilm from adult volunteersusinga TA mouthwash thrice daily but biofilm lysinedid not increase and biofilm accumulation was downshifted with respect to its lysine content. Gingival crevicular fluid (GCF), an inflammatory exudate,associates withan impairedepithelial barrier and wasalso reduced after OHR with TA, yet its exudation rate positively associated with salivary TA content 3 h following a mouthwash. Inhibition of gingival fibrinolysis by TA may cause ligneous periodontitis. *E. corrodens*LDC is a new target for high throughput screening of libraries of natural compounds or US FDA approved molecules for more specific control of gingivitis and chronic periodontitis.

Biography

Martin Levinehas Dental and PhD degrees from the University of Glasgow, Scotland. After a UK MRC-administered fellowship for 1 year as post-doc at the University of Washington, Seattle he spent 2 more years at SUNY Buffalo. He joined the Biochemistry Deptat the University of Oklahoma HSC in 1976 with specific duties to teach and research in dentally-related biochemistry. He has published more than 30 papers and reviews in a wide variety of peer-reviewed journals, and also a new textbook, Topics in Dental Biochemistry (Springer.com, 2011). More recently he has reviewed various papers submitted to dental and non-dental journals.