

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

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Gingival inflammation (gingivitis) is mediated by dentally adherent bacterial biofilms at gingival margins. The biofilms extend apically into the periodontium, causing chronic periodontitis which associates with cardiovascular disease and diabetes (Am J Epidemiol. 177:700-707, 2013). Gingivitis is controlled by tooth cleaning supplemented with non-specific anti-bacterial agents that promote bacterial resistance, fungal infections, and tooth staining (J Clin Periodontol, 34:58-65, 2007). *Eikenella corrodens* in dental biofilms produces lysine decarboxylase (LDC) which impairs the epithelial barrier to pro-inflammatory bacterial products by converting essential lysine to cadaverine (J Periodontol, 83:1048-1056, 2012). Antibodies that inhibit LDC retard gingivitis development in beagle dogs (Vaccine, 30:6706-6712, 2012). Tranexamic acid (TA) is a lysine analog that inhibits fibrinolysis by preventing plasminogen activation. TA inhibited LDC 800-times less effectively than it inhibits plasminogen activator (LDC dissociation constant, $K_i=1.65$ mM). Compared with no TA after oral hygiene restriction (OHR) for a week, cadaverine was decreased in biofilm from adult volunteers using a TA mouthwash thrice daily but biofilm lysine did not increase and biofilm accumulation was downshifted with respect to its lysine content. Gingival crevicular fluid (GCF), an inflammatory exudate, associates with an impaired epithelial barrier and was also 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 Levine has Dental and Ph.D. 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 Dept at 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.

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