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Development of Polymicrobial Periodontal Disease Models.

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The predominant polymicrobial infection of mankind is expressed clinically as periodontal disease. A predominant microbial consortium in the pathogenic biofilm that has been identified in a majority of adult periodontitis patients consists of *Porphyromonas gingivalis*, *Tannerella forsythia* (formerly *Bacteroides forsythus*, a.k.a. *T. forsythia*), and *Treponema denticola* (ie. Socransky et al., “red complex”). While these observations have routinely noted the presence of the consortium, and *in vitro* studies have suggested that they may actually exist in a supportive ecology leading to virulence, minimal direct evidence of synergistic pathogenicity is available to buttress this hypothesis. This study will focus on the utilization of a rodent model of polybacterial oral infection to document a “synergistic” pathogenicity of the consortium. This pilot study will link the polybacterial oral infection and disease in the rats to the capacity of dietary modulation with anti-inflammatory to modulate host responses and periodontal disease. Specifically, dietary n-3 polyunsaturated fatty acid (PUFA) play a role in improving human health by affecting obesity, diabetes, cancer, neurological, cardiovascular and chronic inflammatory diseases through altering signal transduction pathways and control of gene expression. Substantial evidence has established the contribution of host derived inflammatory cytokines and mediators in periodontal inflammation and disease, which can lead to alveolar bone loss and subsequent tooth loss; however, few studies to date focused on the potential that dietary modifications could modulate these host-bacterial interactions in periodontal disease. The major objectives of the proposal are to document a polybacterial infection leading to periodontal disease in rats and to determine the potential of n-3 PUFA on the host response to oral infection and disease. The long-range goal is to understand the cellular and molecular mechanisms of the *P. gingivalis-T. forsythia-T. denticola* polybacterial infection and processes that enable dietary n-3 PUFA to ameliorate tissue destructive aspects of periodontal pathogenesis. The findings would not only be the **first** to document an oral disease synergism triggered by this consortium, but could also identify dietary strategies as adjuncts in the prevention/treatment of periodontal disease(s).

PERFORMANCE SITE(S) (*organization, city, state*)

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KEY PERSONNEL. See instructions. *Use continuation pages as needed* to provide the required information in the format shown below. Start with Principal Investigator. List all other key personnel in alphabetical order, last name first.

Name	Organization	Role on Project
Lakshmyya Kesavalu	UK COD	Principal Investigator
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Disclosure Permission Statement. Applicable to SBIR/STTR Only. See instructions. Yes No

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