PHILIPS

Salivary c-di-GMP levels in relation to immune responses and periodontal infection

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Cyclic dimeric guanosine monophosphate (c-di-GMP) is a bacterial intercellular signaling molecule, which controls the transition from a planktonic, motile lifestyle to a biofilm. In addition, c-di-GMP elicits immune response in host tissues against bacterial infection. Periodontitis is a polymicrobial infection, where bacteria do not only interact with each other, but also with the host immune-inflammatory responses.

In the current project, we hypothesise that c-di-GMP plays a role in the shift from healthy state to disease by regulating the bacterial behaviour and modifying the immune response. Therefore, the aim is to analyse a potential relation between periodontal status and markers of host immune response, periodontal bacteria, and c-di-GMP levels in saliva.

Salivary specimens are available from a subpopulation of the Finnish health survey, Health 2000. Salivary concentrations of immune-inflammatory markers will be analysed by using Luminex techniques. The presence and levels of traditional periodontal pathogens (A.actinomycetemcomitans, P. gingivalis, P. intermedia, T. denticola, and T. forsythia) and some gram-positive pathogens (e.g., F. alocis) in saliva will be examined by in-house built Luminex technique. Salivary c-di-GMP will be detected by using a novel technique developed by Dr. Herman Sintim`s research group from the University of Maryland.

Major strengths of this project are the multiple approaches merging clinical, microbiological, and molecular aspects, and using wide expertise of Turku and Maryland Universities in periodontal microbiology and medicinal chemistry. The results will provide novel information about the mechanisms involved with the periodontal pathogenesis. This information is important, especially if the present project can show a relation between periodontal status and c-di-GMP through the bacterial infection and the immune responses. Then, future studies can be directed through the use of c-di-GMP analogs to disrupt the bacterial signalling systems to stimulate biofilm dispersal and at the same time to activate immune response to disable the planktonic bacteria.