Poster Presentation

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Structural studies of surface adhesins expressed by oral bacteria

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Dental plaque is one of the most complex biofilms known and consists of hundreds of bacterial species. Plaque development is initiated by the attachment of salivary proteins to the tooth surface, followed by adherence of early colonizers, such as the Gram-positive Actinomyces oris and oral streptococci. These bacteria form an initial biofilm that is used as attachment surface for late colonizers. The key factors for these microorganisms to network with other bacteria and cells are their surface adhesins and pili. These Gram-positive surface proteins are assembled by very different mechanisms. One form represents the pili, that consists of polymerized proteins linked by covalent bonds with a large adhesin located at the tip. A second form consists of large monomeric proteins with N-terminal adhesive domains presented on stalks formed by repetitive small domains. A third form is represented by the antigen I/II proteins, expressed by oral streptococci. Antigen I/II have a unique fold where a central domain is presented on a stalk formed by intertwining flanking regions bringing both the N- and C-termini close to the cell wall. We have solved structures representing all three aforementioned groups; the pilin protein FimP from A. oris, the surface adhesin sgo0707 from Streptococcus gordonii and antigen I/II proteins from S. gordonii, Streptococcus mutans as well as from Streptococcus pyogenes. The late colonizers are often Gram-negative and one of these bacteria is the periodontal pathogen Porphyromonas gingivalis. This bacteria causes tooth loss and chronic inflammation and increasing evidence points to that P. gingivalis also is involved in the onset of disease at non-oral sites, causing cancer, cardiovascular disease and diabetes. This bacteria expresses two forms of pili with hitherto unexplored structures. Since these pili are important virulence factors we are focusing on structure determination also of these.

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