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Adhesion of *Porphyromonas gingivalis*: antiadhesive and protective effects of proanthocyanidine rich plant extracts

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The aim of this work was to find antiadhesive compounds which inhibit the adhesion of *Porphyromonas gingivalis*, the main causer of periodontitis, to the gingiva.

Initially the impact of several secondary plant compounds on the bacterial adhesion was screened by hemagglutination assay and flow cytometric binding analysis using the KB cell line. After these experiments, three plant extracts were identified to be very effective through interaction with the bacterial surface: an ethanolic extract out of *Myrothamnus flabellifolia* Welw., an acetonic extract out of *Rumex acetosa* L. and a water extract out of *Rhododendron ferrugineum* L. This inhibition of adhesion is likely due to inhibition of enzymatic activity of *P. gingivalis* proteases, so called gingipains. Investigations done by HPLC and anthocyanidin reaction could demonstrate a binding of proanthocyanidins of the plant extracts onto the bacterial surface.

Furthermore the toxicity of these antiadhesive candidates was characterized by MTT- and agar diffusion tests and revealed a time and concentration dependent toxicity impact of the polyphenolic extracts on *P. gingivalis* and KB cells.

Finally gene expression studies were carried out to investigate the impact of the plant extracts on several virulence factors (*rgpA*, *kgp* and *fimA*) of *P. gingivalis*. A pretreatment of KB cells with the polyphenolic extracts reduced the bacterial triggered expression of interleukins (IL-1 β , IL-6, IL-8, TNF α) and cyclooxygenase-2. These results were confirmed using an IL-6 ELISA.

These results indicate that polyphenolic extracts from *Myrothamnus flabellifolia* Welw., *Rumex acetosa* L. and *Rhododendron ferrugineum* L. have the potential to be used for preventing and treating periodontitis and *P. gingivalis* associated diseases.