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The oral – systemic link: oral infection/inflammation and the relation to general health

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ABSTRACT

Increasing evidence suggests an independent association between periodontitis and a range of comorbidities, among others: cardiovascular disease, type 2 diabetes and rheumatoid arthritis. Shared inflammatory pathways are likely to contribute to this association, but distinct causal mechanisms remain to be defined. Some of these comorbid conditions may improve by periodontal treatment, and a bidirectional relationship may exist, where, for example, treatment of diabetes can improve periodontal status, and successful treatment of periodontitis lowers blood glucose levels (i.e. HbA1c) in the diabetic patient. In this presentation an overview of the evidence linking periodontitis with selected systemic diseases will be discussed. The available evidence for an oral-systemic link calls for increased cooperation between dentists and medical doctors to provide optimal screening, treatment, and prevention of both periodontitis and its comorbidities.

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Effect of saccharomycin, a natural *Saccharomyces cerevisiae* biocide, on *Hanseniaspora guilliermondii* cells surface

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ABSTRACT

Introduction: During spontaneous wine fermentations, most of the non-*Saccharomyces* yeasts present in grape musts show an early decline in their population. It was traditionally assumed that *Saccharomyces cerevisiae* (*S.c.*) prevalence was due to the higher resistance of this species to ethanol. However, wine fermentations performed with single cultures of non-*Saccharomyces* strains showed that those strains could withstand much higher ethanol levels [1]. It was then found that *S.c.* (strain CCMI 885) produced antimicrobial peptides (AMPs) that are responsible for the early death of the non-*Saccharomyces* yeasts [2]. In previous work, we isolated, purified and sequenced those ntimicrobial peptides (AMPs) and found that they derive from the glyceraldehyde 3-phosphate dehydrogenase enzyme [3]. These GAPDH-derived AMPs compose the natural biocide secreted by *S.c.*, which we named saccharomycin, and are effective against sensitive yeasts both in its natural/isolated and synthetic form [4,5].

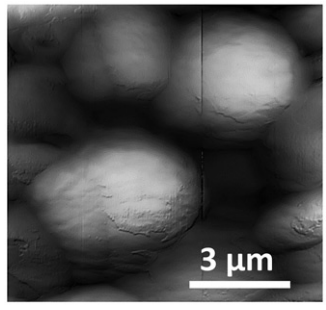

Figure 1. AFM image of H.g. cells after contact with the anti-microbial peptide (Saccharomycin) for 24 h, with roughness increase and surface rupture.

Materials and methods: *Hanseniaspora guilliermondii* (*H.g.*) were grown from 8 to 48 h in YEPD, centrifuged and washed (ethanol 3% or 6%) prior to incubation with natural the *S.c.* AMPs, at 25 °C for 1 or 2 h. Surface of *H.g.* cells were observed by Atomic Force Microscopy (AFM).
Results: AFM images of *H.g.* cells before and after (Figure 1) exposure to the AMPs show a significant changes on their surface.
Conclusions and discussion: Analysis of the cell's roughness, reveals that untreated cells are smooth, unlike the treated with AMPs. Cell's surface roughness increased upon AMPs contact by about 50% from 40.31(±12.87) nm to 58.01(±13.97) nm. Surface morphological details also indicates a destructive effect of saccharomycin on the *H.g.* cell wall.

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Interaction between gold nanoparticles and blood proteins

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ABSTRACT

Introduction: Metallic nanoparticles constitute promising biosensing systems, due to their high affinity to biomolecules such as proteins, which form protein coronas of distinct compositions on their surface [1]. Gold nanoparticles (AuNP) are particularly interesting given their relatively easy, quick and inexpensive synthesis, low toxicity and ease of functionalization with bifunctional molecules. Usually, these molecules have thiol groups bound to the AuNP surface and bio-friendly chemical groups at the opposite end, allowing for controlled protein adsorption. Such functionalised AuNPs may be used as probing agents for a patient's droplet of blood and the health state can be based on the composition of AuNP-adsorbed protein corona. It is thus important to understand the behaviour of each plasma protein in the corona, divided into a tightly-bound inmost monolayer (*hard corona*) and looser outer layers (*soft corona*), removable through centrifugation [2].
Materials and methods: AuNP synthesis was performed according to a modified Turkevich method and AuNP diameter and concentration was determined by UV-Vis spectroscopy. AuNPs were functionalised with 11-mercaptoundecanoic acid and further conjugated with bovine or human serum albumin or fibrinogen. These single protein conjugates were evaluated for hydrodynamic diameter changes after centrifugation by dynamic light scattering (DLS). Agarose gel electrophoresis (AGE) allowed to determine electrophoretic mobility and concentration-dependent conjugation efficiency. Analysis of AGE profiles was by the open source electrophoresis gel image processing software eReuss.
Results: DLS showed a decrease in hydrodynamic diameter for centrifuged conjugates of 40 nm gold nanoparticles, with too high polydispersity indexes for the 13 nm ones, suggesting aggregation. AGE revealed a decrease in electrophoretic