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fraction of biofilm cells surviving Ga-Cit$_3$ treatments was measured by fluoresceine diacetate staining.
Biofilm formation was preliminarily assessed using prototypic *A. baumannii* strains grown in different low-iron media (Gentile *et al.*, 2014, *Pathogens* 3:704-19). Strain ACICU and TSBD medium were selected due to highest biofilm yields. The minimal inhibitory concentration (MIC) for planktonic cells, determined by the microdilution method, was high in TSBD (*i.e.*, 8 mM) and Ga-Cit$_3$ was bacteriostatic at concentrations up to 4xMIC. Biofilm formation was reduced by ca. 50% and 70% at sub-MICs concentrations (0.1 mM and 4 mM Ga-Cit$_3$, respectively). Pre-formed ACICU biofilms were disrupted by ca. 50% upon 72-h treatment with 2xMIC Ga-Cit$_3$, concomitant with ca. 30% reduction in viable cell yields. The exopolysaccharides content of *A. baumannii* biofilm matrix was not affected by the treatment. We also demonstrate that *A. baumannii* ACICU can form biofilm on polystyrene in human serum. The MIC of Ga-Cit$_3$ in human serum (16 µM) was much lower than in TSBD. However, the minimal biofilm inhibitory concentration of Ga-Cit$_3$ in serum equaled the MIC, and sub-MIC Ga-Cit$_3$ did not affect biofilm formation.
In conclusion, high Ga-Cit$_3$ concentrations are required to inhibit or disrupt *A. baumannii* biofilms in a laboratory medium. However, low Ga concentrations can prevent *A. baumannii* biofilm formation in human serum. Thus, Ga holds promise as an antibiofilm agent, e.g. for the coating of implants and medical devices.

C36. Oregano essential oils activity against *Listeria monocytogenes* biofilms

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Listeria monocytogenes is an important foodborne pathogen and the cause of several outbreaks involving human deaths worldwide. *L. monocytogenes* strains may grow in biofilms that protect them towards environmental stress and cleaning and disinfection procedures in food processing plants. Persistent strains adhere to surface and form biofilms more easily compared to sporadically isolated strains, suggesting that the adherence to the surface is an notable factor for the survival and persistence in food-processing environments. Several novel approaches to avoid adhesion of *L. monocytogenes* have been proposed, but high costs, practical difficulties or resistance problems limit their practical use. Despite considerable research on the adhesive properties and resistance of *L. monocytogenes* enabling its survival in the food production environment, a final solution to avoid the establishment of the bacterium has not been found yet.
The extracts and essential oils obtained from different plant species, have a recognized antimicrobial activity and could be an interesting source for new anti-biofilm agents to combat *L. monocytogenes*.
In this study, we focused on the biofilm-forming ability of various *L. monocytogenes* isolates from food and on its correlation with the presence of genes like *agr A*, *agr B*, *agr C*. The property of carvacrol rich and thymol rich essential oils of oregano to prevent the bacterial growth as biofilms was also evaluated. The results showed a good activity of these oils in preventing biofilm formation of the best biofilm-producers isolates of *L. monocytogenes*. With sub-MIC concentrations of 400, 200 and 100µg/ml, that do not affect bacterial growth of planktonic forms, percentages of inhibition of biofilm formation ranging from 56 to 43% were observed.
Further studies are in progress to detect the mechanism of interference with the adhesion of bacteria to the substrate, however their anti-biofilm property looks promising to contrast *L. monocytogenes*. The prevention of biofilm formation, responsible for the bacterial persistence in the environment of food processing plants, could be very important to control these pathogens representing an increasing concern in food safety.

C37. Antimicrobial effects of *Punica granatum L* extracts and *Zanthoxylum rhoifolium* extracts on *Rothia dentocariosa* and *Streptococcus mutans*

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The dental caries is a disease with chronic-degenerative nature and multifactorial etiology, characterized from dissolution of hard tissues of the tooth by acids produced of bacterial metabolism. The carious disease, according to the ecological hypothesis recently proposed by Marsh, occurs due to a change in the microbial community of the biofilm present on the surface of the tooth.
It is widely recognized the role of *Streptococcus mutans* that has the ability to live and proliferate in an acid environment, deleterious for the majority of bacterial species of the oral microbiota. It is able to express different virulence factors, including the glucosyltransferase (Gtf), that enable it to be positively selected and start the pathological process.
Instead, *Rothia dentocariosa*, whose role is less well known in the caries disease, appears not to be a normal commensal of the oral cavity but is probably an opportunist able to actively promote the early caries lesions; in fact, its isolation may be considered an early index of carious lesion in progression.
Recently, plant extracts have shown to be a good alternative to conventional antimicrobials, that are cause of sometimes severe side effects. This is very interesting in light of the growing spread of the phenomenon of antimicrobial resistance and the emergence of super-infections that are on the rise due to overuse and inappropriate use of antimicrobials.
Specifically, in this study we assessed the antibacterial effects of *Punica granatum L.* fruit extracts and *Zanthoxylum rhoifolium* bark extracts against the strain ATCC 25175 of *S. mutans* and the clinical isolate Rd1 of *R. dentocariosa*.
To quantitatively evaluate the inhibitory effect of extracts on bacterial growth and survival, several microbiological assays of antimicrobial activity were developed.

C38. Comparative metagenomics of oral microbiomes of hunter-gathererand farmer populations from the Philippines

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The oral microbiome, the complex ecosystem of microbes inhabiting the human mouth, is composed by hundreds of bacterial species and plays a key role in human health. The effects of human sociocultural evolution affecting diet and lifestyle have been associated with the upsurge of chronic oral disease, which is endemic in industrialized societies but seems less common in both ancient and extant hunter-gatherers. While much is known about individual species associated with pathogenesis, the study of co-evolutionary dynamics between host and commensal microbiota remains a largely novel field of investigation. Here we investigated the oral microbial diversity of three pairs of populations of hunter-gatherers (HG) and agricultural groups from the Philippines that live in close proximity and share similar natural resources.
We applied deep shotgun sequencing of saliva-derived DNA, generating both microbiomes and associated human genomes at high coverage. Diversity of the salivary microbiome was reconstructed from a set of 33 conserved marker genes extracted from the bulk metagenomic DNA and was explored using an explicit phylogenetic framework and multivariate statistical analyses. This approach revealed unprecedented patterns