

“Social” behavior of bacteria – three examples from our skin microbiome

Holger Brüggemann, Department of Biomedicine, Faculty of Health, Aarhus University

The human skin microbiome, our “second” skin, protects the host against environmental stress but also against invaders, such as pathogenic bacteria. As such the healthy skin-associated bacteria have evolved mechanisms of interaction, cooperation, and defense. Bacteria interact and interfere with each other within but also across species boundaries. In this talk three ways of bacterial “communication” will be presented with examples from the skin microbiome. The exploitation of these systems to help against the current antimicrobial resistance (AMR) crisis will also be discussed.

1. Invading organisms need to be kept in check. Thus, skin bacteria have evolved molecules that are used as weapons against invading organisms. For instance, coagulase-negative staphylococci (CONS) can produce a set of bacteriocins that can eliminate other bacteria. Harnessing the power of these molecules and their producers (as probiotics) can be an adjuvant alternative to the use of classical antibiotics.

2. Bacteria can sense the density of their populations by quorum sensing (QS). QS is a powerful system to regulate bacterial properties such as virulence, biofilm formation, and defense systems. Some bacteria can influence the QS system of other bacteria by quorum quenching (QQ). The exploitation of QQ is another possible strategy in the fight against AMR, in particular against methicillin-resistance *Staphylococcus aureus* (MRSA).

3. Biofilm formation is a multicellular strategy of a bacterial species to colonize, withstand host defenses and harsh conditions including antibiotic exposure. Biofilm formation poses a threat particularly in the treatment of implant-associated infections (IAIs). Skin bacteria such as CONS have evolved different strategies to form biofilms. Understanding the underlying mechanisms is an important step in the fight against IAIs caused by skin bacteria.