

FTIR Spectroscopy in Host –Pathogen Interaction

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Bacterial pathogens have developed a variety of strategies to circumvent, resist or counteract host immune responses. The knowledge about the underlying mechanism employed by a particular pathotype is important to develop a targeted prevention and/ or therapeutic strategy. We aimed to decipher the suitability of Fourier Transform Infrared (FTIR) spectroscopy for monitoring metabolic adaptations of bacterial pathogens during the progression of infection to gain novel insights into the host-pathogen interaction.

Staphylococcus aureus frequently causes chronic and persistent infections in humans and animals. Since, loss of capsular polysaccharide expression was shown to be an important feature associated with *S. aureus* persistence, we developed a high-throughput method for discrimination of capsule expressing (serotype 5 and 8) and non-expressing *S. aureus* strains [1]. Based on the new capsule polysaccharide typing system we investigated persistence, transmissibility, and host adaptive changes during *S. aureus* intramammary infection in dairy cattle. Several distinct biotypes were identified at the individual and herd level, which showed typical phenotypic features linked to bacterial chronicity including biofilm formation. Furthermore, we recently demonstrated the method's power for studying bacterial host adaptation on a macromolar and metabolic level. We found that specific bacterial biotypes of *Streptococcus uberis* correlate with the uterine health status of the cows [2] and showed that FTIR spectroscopy is able to differentiate between *Listeria monocytogenes* derived from different mouse genetic backgrounds that differ in their susceptibility to infection, suggesting a reversible metabolic adaptation of bacteria to host environment [3].

In summary, biotyping by FTIR spectroscopy is a promising tool for tracking a bacterial phenotype in the infected host and provides novel insights into the progression of infection and host adaptive processes.

References

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