Typing of Bacteria via FT-IR Spectroscopy – a Complement for Species ID by MALDI TOF MS?

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Since the 1990s numerous studies showed that vibrational spectroscopy can be a valuable tool for analyzing microorganisms at species level and even below. The analysis via FT-IR spectroscopy is an easy to perform, universally applicable and economical method. It could help to subtype microorganisms and/or track contamination routes and therefore be a valuable asset for routine microbiology laboratories in the clinical, pharmaceutical, food and veterinary sector. Despite this promising perspective FT-IR spectroscopy up to now isn't a widespread used method in the routine laboratories.

MALDI TOF MS on the other hand is now a well-established and accepted method for species identification of microorganisms. It is fast and robust and like FT-IR needs pure cultures to start with, but shows much more tolerance regarding the cultivation conditions of the sample. Though there are some studies that show a certain discrimination power of MALDI TOF MS below species level, these are often the result of cumbersome peak picking which cannot be automated in the moment.
The idea to complement the species identification via MALDI TOF MS by the subtyping capabilities of FT-IR spectroscopy suggests itself.

Because typing via FT-IR spectroscopy is very sensitive to changes in the sample cultivation and preparation process one has to make sure that protocol and hardware lead to reliable and reproducible results while still being acceptable for routine use. This presentation will give an overview of our latest experiments regarding the influence of various cultivation, preparation and measurement parameters. The reproducibility of measurement results from lab to lab of one fixed protocol was evaluated in a multi-center study with isolates of the species *Staphylococcus aureus* and *Klebsiella pneumoniae*.
The discrimination power – that must be competitive with other available (molecular) typing methods – was evaluated with several clinically relevant bacteria like *Acinetobacter baumannii, Pseudomonas aeruginosa* and vancomycin resistant enterococci (VRE). Furthermore serotyping of *Legionella pneumophila* was tested.