

Culture-free identification of pathogens by means of micro-Raman spectroscopy

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In the last years the identification of microorganisms by means of different IR and Raman spectroscopic techniques has become quite popular. Most of the studies however apply the various vibrational spectroscopic methods to bulk samples which require at least a short cultivation time of several hours. Nevertheless, bulk identification methods achieve high classification rates which enable even the discrimination between closely related strains [1] or the distinction between resistance capabilities [2].

However, applying micro-Raman spectroscopy with visible excitation wavelengths enables for the detection of single microorganisms. [3] Especially for severe diseases like e.g. sepsis this method is capable for a cultivation-free identification of bacteria. Since in the case of sepsis, the patient's survival rate drops approximately by 6-10 % every hour after the onset of the septic shock, the identification of the pathogen should be accomplished without time delay.

In doing so, we established different isolation techniques in combination with Raman spectroscopic identification. Isolating bacteria from different matrixes always has an impact on the Raman spectroscopic identification capability [4]. Therefore, these isolation techniques have to be specially designed to fulfill the spectroscopic requirements. In total the method should enable the identification of pathogens within the first 3 hours.

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