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Abstract

Solid-Phase Microextraction as an Antibiotic Resistance Detector in *Staphylococcus aureus* Strains †

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Abstract: Bloodstream infections, which result from introducing contaminated implants or prostheses to a patient's body, are commonly caused by *Staphylococcus aureus strains*. The occurrence of staphylococcal-related bloodstream infection correlates with an elevated risk of sepsis, which poses a threat to a patient's health and life. The microbiological diagnostic procedure of bloodstream infection takes between 3 and 7 days, during which the patient receives broad-spectrum antibiotics that contribute to drug resistance. The application of the Solid-Phase Microextraction method (SPME) in sepsis diagnosis may reduce diagnostic time by up to 2 h. Therefore, the aim of this study was to investigate the suitability of the Solid-Phase Microextraction method in the differentiation of methicillin-susceptible *Staphylococcus aureus* (MSSA) from methicillin-resistant (MRSA) strains based on the volatile compounds secreted by these bacteria. For this purpose, five MSSA and five MRSA strains were tested. Volatile compounds were isolated using a headspace-SPME modification and distributed and analyzed by employing combined gas chromatography with mass spectrometry. Comparing the profiles of the secreted volatile metabolites, we found significant differences between the compositions of MRSA and MSSA metabolomes. The results may serve as a proof of concept for further research aiming to create a new analytical method. Shortening the time of diagnosis of sepsis to 2 h will significantly reduce patients' risk of death.

Keywords: bloodstream infection; MRSA; MSSA; sepsis; SPME; metabolomics

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