

Biomarkers for rapid differentiation of *Bacillus anthracis* from *B. cereus* group non-anthraxis strains using matrix-assisted laser desorption ionization-time of flight mass-spectrometry (MALDI-TOF)

A. Egli¹, M. Osthoff², A. Berini¹, N. Schuerch¹, S. Leib¹, R. Frei¹

¹Division of Clinical Microbiology- University Hospital Basel, Basel, Switzerland

²Division of Infectious Diseases and Hospital Epidemiology- University Hospital Basel, Basel, Switzerland

Introduction: The current MALDI-TOF Biotyper (Bruker) databases including standard and security-relevant (SR) peak spectra cannot reliably differentiate between species within the *Bacillus cereus* group. However, a reliable and rapid identification of *B. anthracis* with MALDI-TOF could offer a critical time advantage in the clinical management of human anthrax including bioterror attacks.

Methods: We established a MALDI-TOF-based identification algorithm based on a clinical case of cutaneous anthrax. The strain isolated showed typical morphological criteria and was confirmed by PCR at the Swiss reference center. After a full-protein extraction, mass-peak spectra of the *B. anthracis* strain and six *B. cereus* group non-anthraxis strains were analysed with the Biotyper software. A peak list of every single strain was generated with peaks >1000 arbitrary intensity units and compared to the other strains (**Figure 1A**).

Results: Overall 155 peak positions were identified. However, for further analysis we only included peaks with a signal/noise ratio >10. For the *B. cereus* group non-anthraxis strains, we identified seven specific peaks occurring in all strains at 3885, 5217, 6265, 6795, 7368, 9646, and 9990 Dalton (m/z). In contrast, the *B. anthracis* strain showed three peaks, which were unique in comparison to the other non-anthraxis strains (3652, 4551, and 6679 Dalton, **Figure 1B**).

Conclusions: The identified MALDI-TOF peaks could be used as specific biomarkers to differentiate strains within the *B. cereus* group. These preliminary results should be confirmed with larger strain collections.

Figure 1. A. List of MALDI-TOF peaks specific for *B. anthracis* and *B. cereus* group non-anthraxis strains. **B.** Representative example of a specific peak for differentiation.

