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MALDI-TOF and the classical Bordetella species: a brief experience

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Background: Classical *Bordetella* species are comprising by *B. pertussis* (Bp), causal agent of whooping cough, *B. parapertussis* (Bpp) and *B. bronchiseptica* (Bb), both associated with respiratory infections in humans and other mammals. Publications suggest that Bp, Bpp and Bb are very closely related. MALDI-TOF cannot. reliably differentiate them according to the manufacturer. Identification may be complicated when multiple species level matches are among the top 10 results. The aim of this study were to establish the performance of MALDI-TOF for the identification of these *Bordetella species*.

Material/methods: We studied 106 *Bordetella* clinical isolates*, 94* Bp*, 5* Bpp *and 7* Bb, previously identified using conventional and molecular methods. Mass spectra were obtained from direct colony method. The score cutoffs and the consistency category recommended by the manufacturer were used. We evaluated the 10% differential rule used in previous studies as additional criteria.

Results: Of the 106 isolates studied,19 (18%), the top 10 results contained at least one significant mismatch, (Bb 86%, Bpp 20% and Bp 13%). Only 10/106 (9%) of the isolates failed the 10% rule. For *Bp,* 64/94 (68%) isolates, MALDI-TOF MS reported a score >2.0, 29/94 isolates (31%) were identified at the genus level, however, the same species was given in the place of the first and second best match (in some cases even for the third and fourth places), and only 1 isolate gave a score <1.699. Consistency category A was present in 61/94 (65%) of Bp, and 32/94 (34%) were category B. The top ten list presented 100% of concordance in 34/94 (36%) Bp. Of 94 Bp,6 (6%) failed the 10% rule (3 were consistency category A). All Bb were score >2, however 5/7 (71%) were placed into category B and 100% presented at least one mismatch in the top 10 list. Of 7 Bb, 3 (43%) failed the 10% rule (1

was consistency category A). For *Bpp* 4/5 (80%) were score >2, 3 were placed into categories A). The top ten list presented 100% of concordance in 2/5 (40%) of Bpp and 1/5 (20%) failed the 10% rule.

Conclusions: MALDI-TOF has limitation to discriminate these *Bordetella* species probably due the amount of isolates placed into categories B. Rule of 10% may not be always applicable. However expansion of the library, may improve MALDI-TOF MS accuracy, another alternative is to evaluate the performance with the extraction method proposed by the manufacturer, and the last option is to reanalyze the data with other spectral software. Nevertheless mismatches of these species can be resolved by additional test (such as urease test,oxidase test and motility).