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# Performance and workflow comparison between two MALDI TOF MS systems in routine microbiology laboratory settings

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## Introduction

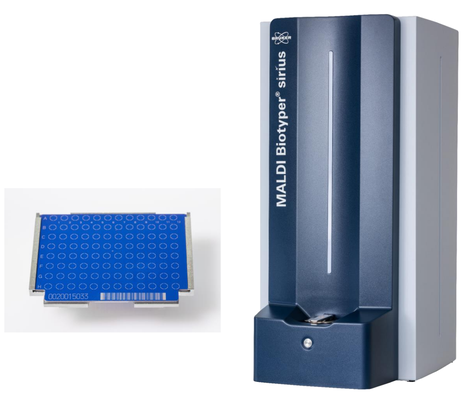
The objective of the study was to compare the accuracy of two of the most important MALDI-TOF MS systems the VITEK® MS PRIME (bioMérieux) and the MALDI Biotyper® Sirius (Bruker Daltonics) for microorganism identification from agar plates. In addition a workflow comparison concerning routine laboratory setting was performed.

## Methods

927 isolates (54% Gram-positive-, 42% Gram-negative-bacteria and 4% yeasts) from agar plates containing 214 different species, were measured. The isolates tested comprised 511 retrospectively (including “challenge strains”) and 416 prospectively collected strains. In addition, prospective positive blood cultures inoculated on agar plates were tested after 4-6 hours of incubation (off-label use), with and without formic acid and after 18-24 hours. To enable a workflow comparison of the systems the hands-on-time (HOT) for target and MALDI-TOF instrument set-up and a direct analysis of the total time to results (TTR) including the system measurement was performed for 16 target slides with 16 colonies on each.

## Results

Figure 1. Systems evaluated




Biotyper Sirius
Database Vers. 5.2.300


VITEK® MS® PRIME
Database Vers IVDR KB3.2

Figure 2. Workflow comparison (HOT, TTR)

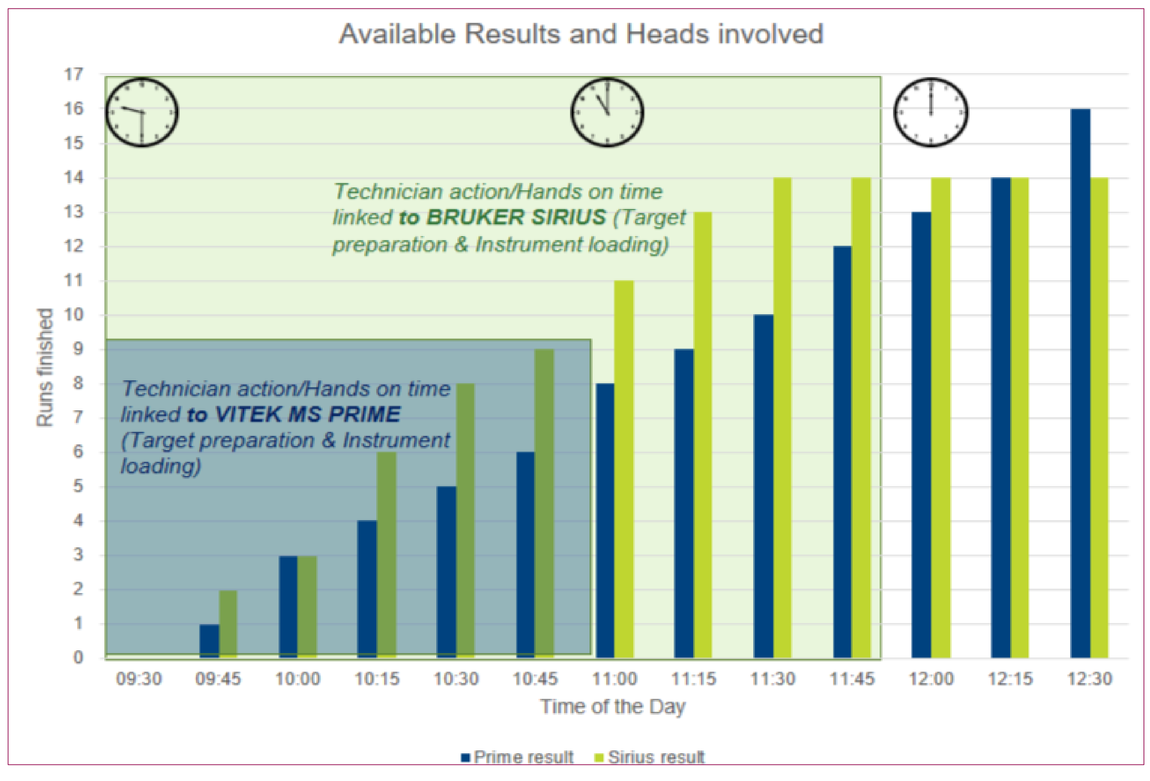



Table 1. Identification result (Colonies on agar plates)

| Parameters | Biotyper Sirius n (%) | VITEK® MS PRIME n (%) |
|---|---|---|
| Total no. of isolates | 927 | |
| Isolates with No ID[a] | 68 | 27 |
| Isolates with No ID in both instruments | 15 | 15 |
| Isolates with ID[a] | 844 (91.1) | 885 (95.5) |
| Score >2.0 | 658 (78.0) | |
| Score 1.7-1.99 | 186 (22.0) | |
| Conf. Value 99.9% | | 817 (92.3) |
| Conf. Value 60-99.8% | | 68 (7.7) |
| Isolate ID-pairs compared[b] | 817 | |
| Agreement on genus level | 812 (99.4) | |
| Agreement on species level | 793 (97.1) | |

[a]Isolates with missing ID were repeated in RUO mode; [b]ID obtained with both instruments for the isolates tested

Table 3. Workflow comparison

| Parameters | Biotyper Sirius | VITEK® MS PRIME |
|---|---|---|
| Total Time to Result (start until final ID) | 155 min | 191 min |
| Hands on Time (bounded to process) | 155 min | 106 min |
| HOT/Identified Isolates | 44 s | 25 s |
| Total Time/Identified Isolate | 44 s | 45 s |

Table 2. Identification results (prospective blood cultures inoculated on agar plates)

| Parameters | Biotyper Sirius n (%) | VITEK® MS PRIME n (%) | P-value |
|---|---|---|---|
| Total no. of specimens | 119 | | - |
| short culture | 105 (88.2) | 118 (99.2) | 0.00007 |
| short cult. + formic acid | 110 (92.4) | 113 (95.0) | 0.42 |
| standard culture | 118 (99.2) | 119 (100) | 1 |

- Good performance results with excellent agreement between both instruments (97.1% at species level, Table 1) for identification of colonies on agar plates.
- For the identification of short cultures inoculated from positive blood cultures both systems showed similar performance when using formic acid.
- TTR is shorter with Sirius (Δ = 36 min) while the HOT bounded to the process is shorter with VMP (Δ = 49 min).

## Conclusions

Both MALDI-TOF systems evaluated in this study showed an excellent agreement for the identification of a wide range of different species. For a lab working with a high throughput of slides, VITEK® MS PRIME reduces the HOT due to the “Load and Go” mode, giving the technician more time for value-added activities. Depending on the lab organisation of the identification process, both systems are very well suited for a convenient laboratory workflow.

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