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Detection of Group B *Streptococcus* among pregnant women in Rio de Janeiro/Brazil by MALDI-TOF MS

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Background

Intrapartum antibiotic prophylaxis (IAP) is currently the most effective way to prevent Group B *Streptococcus* (GBS) neonatal infections. IAP is driven by the results of culture-based GBS screening of pregnant women at 36-37 gestational weeks, but GBS colonization status is known to fluctuate during pregnancy. Thus, an ideal GBS screening method should be as close as possible to the time of delivery.

Standard culture-based techniques have a long turnaround-time (TAT) and represent an expensive approach in many LMIC, which might result in the inadequate use of IAP in certain cases. Thus, development of a cost-effective, reliable and fast screening method is required and could help improving prevention of GBS neonatal infections in both HIC and LMIC.

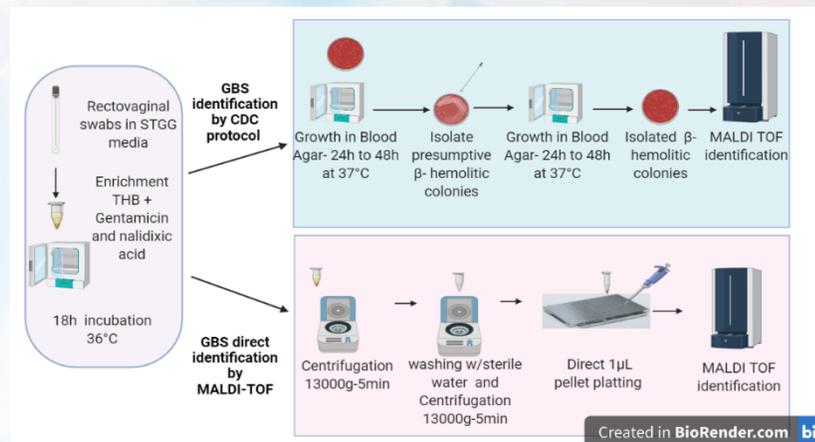
In the last decade, MALDI-TOF MS has emerged worldwide as a popular tool for fast bacterial identification, including laboratories located at LMIC. Here we evaluated a MALDI-TOF MS-based method for GBS detection directly from anovaginal specimens recovered from pregnant women.

Objectives

Our aim was to evaluate the use of MALDI-TOF MS as an alternative and fast approach for detecting GBS directly in anovaginal samples of pregnant women by comparing with the gold-standard culture-based method.

Material & Methods

Anovaginal samples of 612 women attending the Maternity School of UFRJ, between July 2019-May 2021, were processed after pre-enriching clinical samples with Todd Hewitt broth supplemented with gentamicin and nalidixic acid for 18h at 36°C, and subcultured onto blood agar plates for 24h to 48h at 36°C. After incubation, presumptive beta-hemolytic colonies were identified by MALDI-TOF. Direct detection of GBS from clinical samples by MALDI-TOF MS was performed with 1mL of the pre-enriched broth, using a Bruker Microflex LT equipment. The complete step by step is shown in the box below.



Results

The number of **total agreements was 597 (97.55% of the observations)**. The **sensitivity and specificity** of the proposed method were high (**81% and 100% respectively**). The **Kappa coefficient was 0.856** with 95% of confidence interval. The Wallace coefficient was also calculated and displayed a high level of congruence between both methods (Table 2), which corroborates the ability of MALDI-TOF MS to predict a true positive sample by culture method.

Table 1. Comparison between MALDI-TOF-based and culture-based techniques for GBS detection

		MALDI-TOF		
		Positive	Negative	Total
CULTURE	Positive	50	15	65
	Negative	0	547	547
	Total	50	562	612

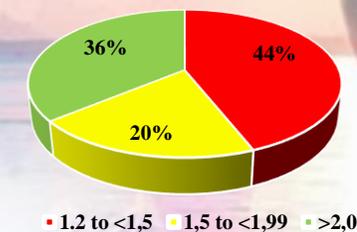
Table 2. Wallace (a) coefficient for Culture x MALDI-TOF detection approach with 95% Confidence Interval.

(a)	Culture	MALDI-TOF MS
Wi	0.810	0.850
Culture		0.995 (0.993-0.997)
MALDI-TOF MS	0.948 (0.923-0.974)	

Results

Our main limitation was the high rate of medium and lower scores found in MALDI TOF-MS runs (Figure 1). However, after analysis, we found that any score obtained from clinical samples when GBS was detected, which varied from 1.205 to 2.397, showed that a **positive detection of GBS in MALDI-TOF, regardless of the score associated, agreed 100% of the times with a positive culture.**

Fig. 1 : Distribution of MALDI- TOF scores among anovaginal samples from which GBS was detected.



Conclusion

Agreement, specificity and sensibility of MALDI-TOF in comparison to culture-based method were high; and the TAT of MALDI-TOF method was less than a half of the TAT of culture. Overall, our results suggest that detection of GBS directly in clinical samples using MALDI-TOF MS is a suitable, fast, and reliable alternative for GBS screening among pregnant women.

Acknowledgements:

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