EVALUATION OF LIAISON® MeMed BV® TO DISCRIMINATE BACTERIAL AND VIRAL INFECTIONS

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BACKGROUND AND AIMS

Bacterial and viral infections are difficult to recognize because often share the same symptoms and so clinical features alone are not sufficient to identify the etiology of the infectious disease [1]. This leads to a misuse of antibiotics with serious consequences both on an economic and public health level. An overuse of these drugs determines the onset of antibiotic resistance while a lack of use can lead to a prolonged state of illness [2]. Routine microbiological investigations can take a long time before providing a clear indication of the cause of the infection and for this reason, other tools are needed to assist the clinician in the choice of right therapy. A possibility could be using proteins of the host-immune response to infection as biomarkers to predict the type of pathogen responsible for infection. The aim of our study was to analyze the performance of the LIAISON® MeMed BV® (DiaSorin, Saluggia, Italy) to distinguish between bacterial and viral infections.

MATERIALS AND METHODS

Blood samples, analyzed by DiaSorin LIAISON® MeMed BV® were collected from hospitalized patients or from subjects admitted to emergency room and selected based on a confirmed microbiological bacterial or viral infection (positive blood culture or positive RT-PCR for respiratory viruses, respectively). DiaSorin LIAISON® MeMed BV® is an automated *in vitro* diagnostic semi-quantitative assay that uses chemiluminescent immunoassay (CLIA) technology to measure three non-microbial host proteins (TRAIL, IP-10, and CRP) in adult and pediatric samples to differentiate bacterial from viral infections. The test provides a score from 0 (viral infection) to 100 (bacterial infection) calculated through an algorithm after the dosage of the three proteins.
The results are expressed as: HighVIR (from 0 to 10), HighBACT (from 90 to 100), ModBACT (from 65 to 89), ModVIR (from 11 to 34) and indeterminate (from 35 to 64) (**Figure 1**).
The Instructions for Use of the kit indicate the exclusion of certain categories of patients, which we have included in the study (5 patients).
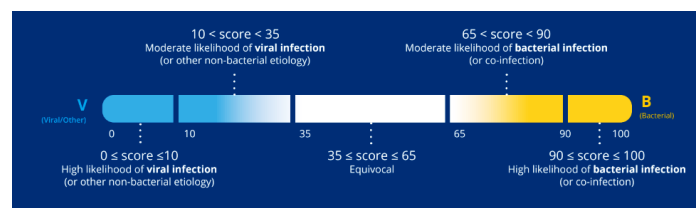

Figure 1: LIAISON® MeMed BV® score interpretation.

RESULTS

Sixty-eight samples collected from 34 males and 34 females were analyzed. The mean age of study population was 60 years old (range 1-94). The average time from symptoms onset to collection was 2.3 days. Standard of diagnosis (SOD) provide a diagnosis of viral infection in 37 patients (54%), bacterial infection in 30 patients (44%) and 1 co-infection.
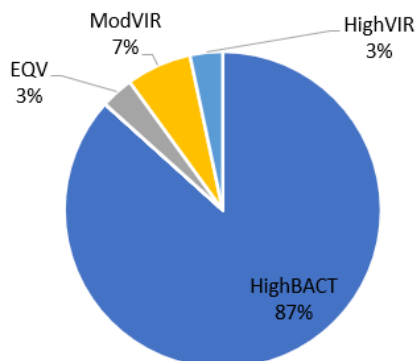The samples collected from patients with a viral infection have been classified as HighVIR or ModVIR in 54%, while the samples from subjects with a bacterial infection have been classified as HighBACT in 87%. (**Table 1, Figure 2**).
The co-infection (SARS-CoV-2 + *Serratia marcescens* and *Streptococcus pneumoniae*) was classified as HighBACT.

SCORE	NUMBER OF SAMPLES		
	TOT.	B	V
HighBACT	34	27	7
ModBACT	3	0	3
EQV	8	1	7
ModVIR	6	2	4
HighVIR	17	1	16

Table 1: number of bacterial and viral sample for each class of LIAISON® MeMed BV® score.
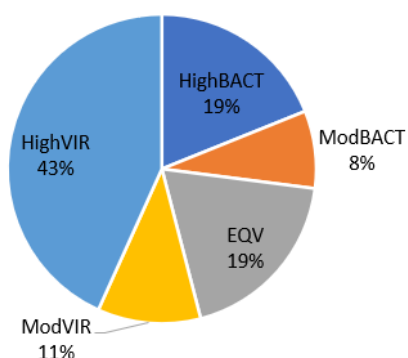
Figure 2: Sample results obtained through the test LIAISON® MeMed BV® divided in bacterial (A) and viral (B) infection according to SOD results.

Excluding the eight samples (11.7%) with an "indeterminate" (EQV) result, the overall agreement was 78%.

For 10 patients with a diagnosis of viral infection and a discordant result obtained with LIAISON® MeMed BV® (HighBACT or ModBACT), further investigations were done. As reported in Table 2, in five cases a co-infection has found (**Table 2**).

VIRAL SAMPLE	ADMISSION DIAGNOSIS	RESULTS OF FOLLOWING MICROBIOLOGICAL TESTS
#1	COVID	*S. aureus* + COVID
#2	COVID	*Citrobacter freundii* + COVID
#3	COVID	*Acinetobacter baumannii* + COVID
#4	COVID	UTI + COVID
#5	COVID	*Pseudomonas aeruginosa* (UTI) + COVID

Table 2: Results of microbiological tests after admission diagnosis.

After this in-dept analysis, that explains the bacterial score for viral samples, the overall agreement was 87%.

The 5 samples collected from immunocompromised patients who should not have been chosen, due to hematological malignancies, instead obtained a score which matches with the diagnosis made through classical methods.

CONCLUSIONS

The data obtained show that LIAISON® MeMed BV® can be an excellent support for the differential diagnosis of bacterial and viral infections, to be used in conjunction with SOD. The main strength of the test is the complete automation of the procedure which in just 40 minutes provides a result that guides the clinician in choosing the most appropriate therapy. Moreover, a bacterial score obtained in patients with a confirmed viral infection could help to find out a co-infection. Future studies should analyze the possibility of application of this innovative methodology also in subjects for which it is not currently used like immunocompromised patients.

References:

1. Papan C, Argentiero A, Porwoll M, et al. A host signature based on TRAIL, IP-10, and CRP for reducing antibiotic overuse in children by differentiating bacterial from viral infections: a prospective, multicentre cohort study. Clin Microbiol Infect. 2022;28(5):723-730. doi:10.1016/j.cmi.2021.10.019.
2. Oved K, Cohen A, Boico O, Navon R, Friedman T, Etshtein L, et al. (2015) A Novel Host-Proteome Signature for Distinguishing between Acute Bacterial and Viral Infections. PLoS ONE 10(3): e0120012. https://doi.org/10.1371/journal.pone.0120012.