Microbial DNAemia: a promising biomarker of sepsis?

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Objectives:

In this study we wish to highlight the impact of Septi*Fast* multiplex Real-time PCR (Roche Molecular System) positives results in the etiological diagnosis of sepsis in patients with clinical and laboratory signs of bloodstream infections (BSI).

Methods

From Sept 2008 to Dec 2011, 910 adult patients (over the age of 18) admitted to the Emergency Department of our hospital with suspected BSI and at least two criteria of SIRS(1) were included in the study. Samples were collected as described in literature(2). If the patient was already receiving antibiotic, BCs were not submitted, since the negative impact of therapy on the diagnostic yeld of BC, even when a BSI is strongly suspected.

Fig. 1.
DNAemia in patients with strong clinical suspect of sepsis.

Microrganism-DNA detected	N°	(SeptiFast+/BC+)	(SeptiFast+/BC-)	(BC not requested)
Asper.fumigatus	2	1	1	0
Candida albicans	7	1	1	5
Candida tropicalis	3	0	0	3
Coagulase Negative Staphylococci	2	1	0	1
Escherichia coli	67	41	16	10
Klebsiella pneumoniae/oxytoca	11	4	4	3
Enterobacter cloacae/aerogenes	6	3	1	2
Enterococcus faecalis	4	0	4	0
Proteus mirabilis	2	1	1	0
Pseudomonas aeruginosa	7	4	0	3
Serretia marcescens	1	0	0	1
Staphylococcus aureus	20	9	5	6
Streptococcus spp.	11	5	1	5
Stenotrophomonas maltophilia	1	1	0	0
Streptococcus pneumoniae	15	7	5	3
Staph.aureus/Kleb.spp	1	0	0	1
Staph.aureus/Str.pneum.	1	0	0	1
Staph.aureus/Ps.aeruginosa	1	0	0	1
Kleb.spp/Enterobacter spp.	1	0	0	1
E.coli / Kleb.spp	3	1	1	1
E.coli/ Ent.faecium	1	1	0	0
E.coli/Ps.aeruginosa	1	1	0	0
E.coli/Serr. marcescens	1	1	0	0
E.coli/Str.spp	1	1	0	0
tot	170	83	40	47

Results

Of the 910 requests for Septi*Fast* PCR assay 170 resulted positives. Among these 170, 83 cases shown concordant results by both methods (Septi*Fast*+/BC+); 40 cases not found correlation with BC results (Septi*Fast*+/BC-); 47 cases were not comparable with BC because the patient were already receiving antibiotic thus BC were not collected (figure 1).

Conclusion

The accurate and timely detection of sepsis remains a challenge. Blood culture (BC) reflects the current gold standard for the detection of bloodstream infection. However, the pratical value of BC in the diagnosis of sepsis, is impaired by the delay in the time to result ant the fact that positive blood cultures can be found for only about 30% of these patients(3). Conventional laboratory signs of sepsis and acute phase protein biomarkers (C-reactive protein, procalcitonin, cytokines) are sensitive and easy to ensure, but often also very nonspecific(4,5). Moreover, in one-third of patients, the causative pathogens cannot be identified(6). Appropriate therapy is therefore delayed. Molecular diagnostic, despite inherent limitations, reflect currently the most promising avenue to decrease time to result and to influence decision making for antibiotic therapy in the septic host(7) .

In conclusion, BC is an indispensable test, as rightly emphasized in literature(1,2,8), and therefore we believe that the two tests do not go more compared. Our data show that in more than 50% of cases we arrived to an etiological diagnosis in critically ill patients strongly suggested of sepsis only with the molecular method in a median time of 15 hours (range 6-30 hours). Therefore, we emphasize the role of DNAemia as a meaningful event and truly specific, ethiological, nonculture-based biomarker of sepsis(8,9,2,5).

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