What is the positivity delay of blood cultures in Infective Endocarditis ?

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Introduction

Blood culture (BC) is a key test for the positive diagnosis of infective endocarditis (IE). In order to detect certain so-called fastidious bacteria and to avoid the absence of documentation, it was usual to repeat the BC (at least 3 series) and to keep them for 21 days. However, at the time of molecular biology, interest of prolonged incubation of BC in case of IE is uncertain.

Methods

To determine the time to first positivity of BC during IE, all patients with documented IE by BC and presented to the Endocarditis Team of our center were prospectively included. The study was conducted in a university hospital between 2013 and 2017.

Results

During the study, 441 patients with IE were hospitalized and 401 IE had a microbiological documentation (91%), including 380 by BC. In 21 cases, the documentation was made by serological tests or specific PCR assays (Table 1). Information on positivity delay was available for 237 patients (135 native valve IE and 102 prosthetic valve IE) and 183 of them (77%) had 4 aero-anaerobic series or more BC. Of the 988 series sampled, 978 (99%) were positive. The main documented bacteria were staphylococci (41%), streptococci (32%) and enterococci (21%). The median time to positivity of the first BC was 11.4 hours [interquartile = 7.3h - 16.7h] and the maximum delay was 93 hours (1 HACEK bacteria and 1 coagulase negative *Staphylococcus*) (Figure 1). There was no difference in positivity delay between the 123 community acquired IE and the 114 healthcare associated IE: 11.2 hours *versus* 11.4 hours. The median growth time was 9.9h for *S. aureus* versus 18h for coagulase negative staphylococci, 11 hours for enterococci and 10.4 hours for streptococci (Figure 2). When IE was complicated by extracardiac emboli, the median positivity delay was 9.7 hours in the case of *S. aureus versus* 12.3 hours for the other bacteria.

Conclusion

In case of IE, our study shows that the median time positivity of the first BC is about 11h and no BC becomes positive beyond the 4th day. Fastidious bacteria are identified by other diagnostic methods. In accordance with British guidelines, we can therefore wonder about the need to multiply and conserve BC beyond a week to document IE.

Table 1. Diagnosis method of bacterial IE with negative BC (n=21)

Microorganism	n	Diagnosis method
Abiotrophia defectiva	1	16S rDNA PCR on valve
Bartonella henselae	3	Serology
Corynebacterium	1	Valve culture
Coxiella burnetti	4	Serology and PCR on valve
Propionibacterium acnes	3	Valve culture
Staphylococci	5	Valve culture
Streptococci	3	16S rDNA PCR on valve
Tropheryma whipplei	1	16S rDNA PCR on valve

Figure 1. Distribution of times to first positivity of BC (n=237)

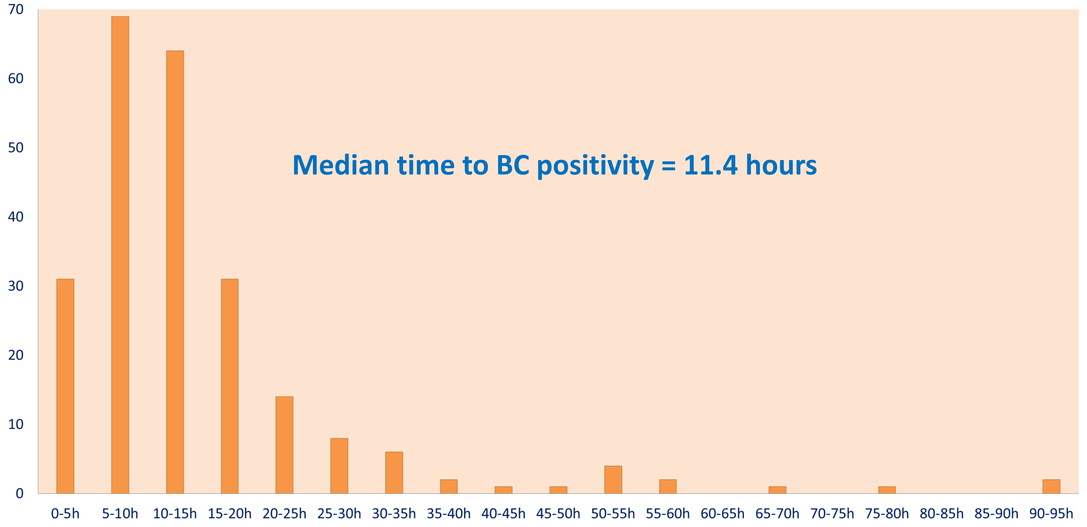
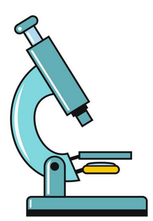
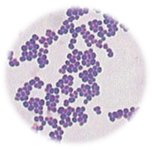
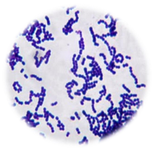


Figure 2. Median time to first positivity of BC by microorganism

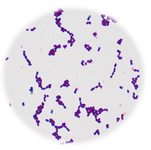




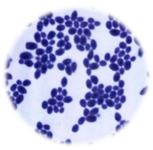
S. aureus = 9.9h
Other staphylococci = 18.0h



Streptococci = 10.4h



Enterococci = 11.2h



Candida sp = 14.7h

References : Petti *et al*, *J Clin Microbiol* 2006. Baron et al, *Clin Infect Dis* 2005. Gould *et al*, *J Antimicrob Chemother* 2012