Abstract 7231

Evaluation of T2MR for the diagnosis of bloodstream infections in paediatric patients

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Background: Bloodstream infection (BSI) is one of the major source of mortality among hospitalized patients. A prompt and appropriate antibiotic therapy is a critical factor to reduce the morbidity and address a favorable clinical outcome. Coltural methods are the "gold standard" althought they require too long times.

The molecular technology T2 magnetic resonance (T2MR) uses two diagnostic panels (T2Candida and T2Bacteria) to detect yeasts and bacteria directly from whole-blood samples within 3-5 hours, in a fully automated process.

Objective of the study is to evaluate the T2MR for rapid detection of pathogens in blood samples of paediatric patients with suspected BSI. Results were compared with those of blood culture (BC) and with the LightCycler Septifast test, a PCR Real-Time for the identification of bacterial and fungal DNA.

Materials/methods: A total of 226 paediatric patients, admitted to the Bambino Gesù Children's Hospital from May 2018 to November 2019, were included in the study and blood samples were contextually analyzed for T2Bacteria and/or T2 Candida, BC and Septifast. The reccomended minimal blood volume samples for T2 testing is 3 ml. When less volume was occurring, samples were diluited or loading was performed through direct pipetting of whole blood directly onto the T2 cartridge.

Results: For T2Bacteria a 76% overall PPA was detected and a NPA of 95%. For T2Candida panel PPA was 100% and NPA 98%. Statistical analysis was elaborated for T2 bacteria including only not diluited samples and an increase of sensitivity and specificity was obtained (PPA 83%; NPA 96%). A total of 70/282 (25%) samples provided discordant results due to these possible reasons: BC and Septifast not performed or with discordant result. A T2 positive result, not confirmed by BC and Septifast, was evaluated in conjunction with clinical presentation and/or other laboratory markers.

Conclusions: T2MR assay can be used to efficiently diagnose BSI caused by bacteria and yeasts from paediatric specimens. This technology shows a significantly faster time to identify microrganisms than a culture-dependent system and this could result in improved time to appropriate pharmacological therapy.

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