Diagnosis of prosthetic joint infections using UMD-Universal Kit and the automated multiplex-PCR Unyvero i60 ITI cartridge system - a Pilot Study

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Background
Prosthetic joint infections (PJI) are associated with high morbidity and costs. Various efforts have been made to improve the diagnosis of PJI over the last years, but only few studies have assessed the diagnostic utility of nucleic acid amplification test (NAAT) techniques in this context. Here, we report our experience with a commercial 16S rRNA gene PCR and an automated multiplex-PCR cartridge system in identifying pathogens causing PJI.

Material and Methods
A prospective single-center study was performed including 54 patients with either septic or aseptic prosthetic joint replacement or surgical revision between 02/2012 and 04/2013. Conventional cultures of periprosthetic tissue samples were compared with the results of broad-range 16S rRNA gene real-time PCR (UMD-Universal Pathogen DNA Extraction and PCR Analysis, Molzym GmbH, Germany) and the multiplex-PCR Unyvero ITI cartridge system (U-ITI; Curetis AG, Germany). Conventional culture and broad-range 16S rRNA gene real-time PCR were performed on all samples. U-ITI was used in a subgroup of 28 cases including all culture-positive cases. The agreement of the results from the methods was assessed.

Results
Of 54 cases, seven were culture-positive. Broad-range 16S rRNA gene real-time PCR gave 6, U-ITI 3 concordant positive results. Of the 47 culture-negative samples, 46 were also negative by broad-range 16S rRNA gene real-time PCR resulting in a 96% (52/54) agreement between 16S rRNA gene PCR and culture. Of the 21 culture-negative samples analyzed with U-ITI, 20 gave negative results, including the single 16S rRNA gene PCR-positive/culture-negative specimen. The rate of agreement between U-ITI and culture results was 82% (23/28).

Conclusion
This pilot study gave no indication of superiority of the used NAATs over conventional culture methods for the microbiological diagnosis of PJI. Drawbacks are susceptibility to contamination in the case of 16S rRNA gene real-time PCR, labour-intensive DNA extraction and limited pathogen panel in the case of the multiplex cartridge PCR system. More prospective trials are needed to evaluate the diagnostic performance of NAATs and their impact on the clinical management of PJI.

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