Evaluation of Unyvero i60 implant and tissue infection (ITI) multiplex PCR System in diagnosing periprosthetic joint infection

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Introduction:
Periprosthetic joint infection (PJI) is one of the most challenging complications in orthopaedic surgery. For diagnosis of periprosthetic joint infection a variety of diagnostic methods are available, i.e. microbiological cultures, x-ray diagnostic, aspiration of joint fluid with cell counting and measurements of blood markers (C-reactive protein (CRP), interleukin-6 (IL-6), leukocytes and erythrocyte sedimentation rate) and histopathological examination of periprosthetic joint membranes.

Methods:
31 patients that received an operative revision in the orthopaedic department of the University Hospital Bonn due to suspected PJI or aseptic loosening of a painful total hip or knee arthroplasty between January 2014 and November 2014 were included in this study (ethics approval University Hospital Bonn 046/09 Rev. 3). The microbiological workup included a minimum of three periprosthetic tissue specimens, joint aspirate and the explanted foreign body for sonication were investigated. Additionally, histopathological examination of the periprosthetic membranes, cell counting of the joint aspirate and multiplex PCR diagnostic of the sonication fluid and of the joint aspirate were performed. All patients were summarized in two different groups (PJI vs. free of infection) according to the classification of the International Consensus Group on Periprosthetic Joint Infection.

Results:
In our collective sonication fluid cultures had a sensitivity of 88.9% with a specificity of 61.5%. Other microbiological specimens, especially tissue samples and joint aspirates showed both a sensitivity of 66.67%, and a specificity of 92.3% and respectively 84.6%.

PCR-based rapid testing of sonication fluid yielded out a sensitivity of 50% with a specificity of 100%. PCR of the joint aspirate documented a slightly better sensitivity of 55.6% with a specificity of 100%. When summarized these two PCRs the sensitivity rose to 66.7% with a specificity of 100%

Discussion and Conclusions:
In summary, PCR-diagnostic is an additional – rapid - method to gain ancillary informations in diagnosing PJI, long before cultures turn positive. Our results showed that combined PCR diagnostics of aspirate and sonication fluid generated almost the same sensitivity as conventional microbiological specimens (tissue samples and joint aspirates combined), but faster and with higher specificity.