Diagnostics and Biofilm Formation with Respect to Chronic Wounds, Catheter- and Joint Prosthesis-Related Infections

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Molecular techniques have shown to be effective in elucidating bacterial diversity in a broad range of environmental samples and lately also in medical samples. In clinical medicine, molecular techniques are often able to identify less common bacteria that do not grow readily on laboratory culture media due to a combination of inadequate growth conditions, prior antimicrobial therapy and the presence of slow, fastidious, anaerobic or unculturable bacteria growing in biofilms.

Studies of microbial communities in chronic wounds, catheter- and joint prosthesis-related infections will be presented. The communities were investigated using culture-dependent methods and a range of culture-independent molecular methods including 16S rRNA gene PCR, construction of clone libraries combined with sequencing and phylogeny, pyrosequencing, fingerprinting, fluorescence in situ hybridization (FISH) and quantitative PCR (qPCR).

In order to reveal possible heterogeneous distribution of the microbes, multiple biopsies were taken from wounds, biofilm was scraped from internal and external catheter surfaces, and during revision arthroplasty several specimen types (joint fluid, tissue biopsy, bone biopsy and prosthesis scraping or sonication fluid) were collected.

The molecular methods identified regularly a larger bacterial diversity than culture and the role of the less common bacteria needs to be studied further. The results showed in addition a significant variation of the microbial composition and yield depending on the position and types of samples used and emphasize the need for multiple samples and methods of processing in order to achieve better diagnosis and ultimately treatment of such biofilm-related infections.