

# Examination of clinical staphylococcal isolates derived from the bone-anchored hearing system and their correlation with clinical results.

Ganeyev, Marsel<sup>1,2\*</sup>; Hoffman, Maria<sup>1</sup>; Palmquist, Anders<sup>1</sup>; Thomsen, Peter<sup>1</sup>; Johansson, Martin L.<sup>1,2</sup>; Trobos, Margarita<sup>1</sup>

<sup>1</sup>*Department of Biomaterials, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden.*

<sup>2</sup>*Research & Technology, Oticon Medical AB, Askim, Sweden.*

**INTRODUCTION:** Despite the generally positive outcomes observed in clinical settings involving bone-anchored hearing systems (BAHS), such as the secure attachment to the temporal bone through osseointegration, the surgical procedure still leads to adverse responses in the soft tissues surrounding the abutment. Therefore, it is crucial to comprehend the microbial pathogenic mechanisms in close proximity to the skin-penetrating abutment to facilitate further improvements in the treatment approach, the design of the system, and its maintenance. The objective of this study was to analyze the microbiological characteristics of staphylococci obtained from three different areas (soft tissue, abutment, and exudate) around the percutaneous BAHS, while also establishing a link between their ability to form biofilms and the clinical outcomes.

**METHODS:** This research investigated 58 clinical strains of staphylococci taken from patients with bone-anchored hearing systems (BAHS) at three different time points: initially, at 3 months, and at 1 year. Three methods were employed for sampling: (i) retrieving abutments, (ii) using paper points to collect peri-abutment exudate, and (iii) obtaining peri-abutment soft tissue samples using a 1 mm biopsy punch. The strains were tested for their ability to form biofilms, with categorization into strong/moderate producers and weak/non-producers. Additionally, the antibiotic resistance of the strains was assessed via tests measuring minimum inhibitory concentration (MIC) and minimum biofilm eradication concentration (MBEC). The study aimed to establish correlations between these findings and clinical patient outcomes, including Holger's score and visual debris.

**RESULTS:** The study involved a total of 58 strains obtained from 16 patients. Among these, 18 were *S. aureus*, while 40 were coagulase-negative staphylococci (CoNS). A significant proportion (62%) of the strains exhibited moderate to strong biofilm-forming capabilities. Subsequently, 13 patients were involved in the follow-up examinations conducted at 3 months and 1 year. Throughout the study, *S. epidermidis*, a common skin colonizer, was present in most patients (n=13), while *S. aureus* was found in half of them (n=5). Several connections between clinical and microbiological factors were discovered at both the 3-month and 1-year follow-ups. Patients with medium or strong biofilm-producing strains (3 out of 4) showed Holger's score  $\geq 2$ . Additionally, patients who faced skin issues such as minimal and moderate debris were colonized by 8 strong/moderate biofilm-producers and 3 non-producers.

**DISCUSSION & CONCLUSIONS:** This study is the first one to examine the biofilm-forming ability of bacteria in connection to clinical outcome in BAHS. Characterizing the microbiota present at different sites surrounding BAHS as well as elucidating their associations with clinical parameters may have relevance for the outcome following implantation. This study might be a foundation for better clinical practices and treatment of BAHS-associated infections.

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