

STANDARDISED CHARACTERISATION OF PERI-IMPLANT BONE STRUCTURE USING CONFOCAL LASER SCANNING MICROSCOPY (CLSM)

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INTRODUCTION: The histologic evaluation of bone adjacent to dental implants is mostly done using the sawing and grinding technique according to Donath and Breuner and the evaluation of stained thin sections by light microscopy. A less time and resources consuming method would be desirable.

METHODS: 190 dental implants (6 different types) which were derived from two different bone types (mandible and maxilla) of beagle dogs were used for this study. The implants were embedded in PMMA (Technovit) and cut along their long axis. The non-decalcified, unstained blocks were evaluated by CLSM (Leica) in the reflection mode (488nm). With a 10x objective images of edge length 1,5 mm, 1024 * 1024 pixel were obtained. An automated biomapping technique with an automated sample stage generated consistent images of the whole implant. Serial scans in the z-axis were obtained to overcome difficulties of obliquities of the sample surface. The maximum projection images of these image staples produced the highest contrast for further qualitative and quantitative evaluation of the periimplant hard tissue.

RESULTS: In all cases high contrast images for the qualitative histologic evaluation were obtained. For the histomorphometric analysis images of the unstained samples it was possible in all cases, after applying a median filter, to process segment using a simple threshold technique.

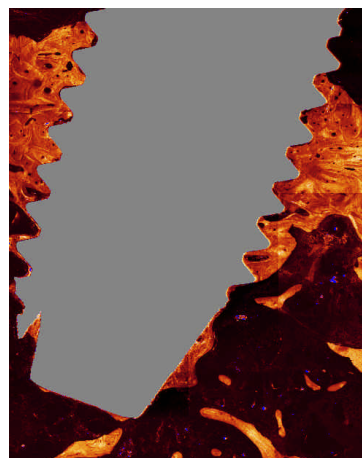


Fig. 1: CLSM reflection image of the total implant 9*6 mm (merging of 6*4 images)

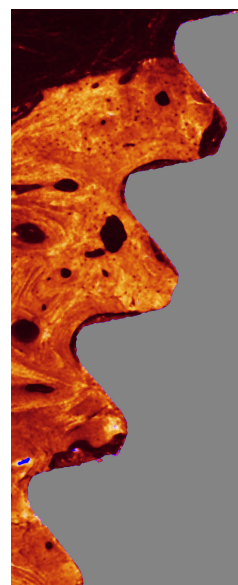


Fig. 2: CLSM reflection image of the bone implant border 1*3 mm

DISCUSSION & CONCLUSIONS: The CLSM technique in the reflection mode can be used a semi-automatic, standardised technique for the evaluation of the peri-implant bone. The evaluation of unstained, non-decalcified bone blocks minimises possible influences of the grinding and staining process.