Lenz S, Kirchhoff M, Gerber T

Enhanced osseointegration of implants with a nanostructured bioactive coating

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Objectives: In this study we tried to investigate weather it is possible to use the properties of the bone grafting material NanoBone® for coating of dental implants to improve their osseointegration.

Material and methods: The implants (group A: Semados®, sand blasted surface, group B ixx2®, sand blasted and acid etched surface) were coated with a silica matrix covering nanocrystalline hydroxyapatite by sol-gel technique. The implants showed differences in screw thread and roughness. Coated (n=18) and uncoated (n=18) implants were inserted in the frontal bone of 8 minipigs. Specimens were excised after 2, 4 and 6 weeks and processed according to the sawing and grinding technique. The bone to implant contact (BIC) was measured by semiautomatic software.

Results: All coated implants showed a higher rate of BIC compared to the uncoated implants. The mean percentage of BIC for coated implants group A was 60.2 %-2 weeks, 66.6 %-4 weeks, and 74.5 %-6 weeks. The uncoated implants of this group reached 57.0 %-2 weeks, 61.3 %-4 weeks and 64.4 %-6 weeks. In group B the BIC was 73.4 %-2 weeks, 70.6 %-4 weeks and 78.0 % for the coated ones. The uncoated implants in this group reached a BIC of 68.5 %-2 weeks, 60.9 %-4 weeks and 45.8 %-6 weeks.

Conclusion: The applied coating of implants enhances the BIC. Earlier loading of such modified implants can be considered.