Human Biopsie Study:
Long-term Bony Integration Kinetics of a Xenogenic Bone Substitute

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Objectives
Systematic histomorphometric analysis of two human bone biopsies after sinus grafting with a xenogenic bovine bone substitute material (BSM: Bio-Oss®).

Methods
During preparation of the implant site, trephine bur bone biopsies were obtained 10.5 months and 4 years 7.5 months after sinus grafting. Subsequent histomorphometrical (μ-CT) and histological analysis.

Results (for both investigated specimens)

μ-CT analysis: formation of bone tissue with tight bony incorporation of the BSM.

Histomorphometric data

<table>
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<tr>
<th>Specimen Age</th>
<th>New Bone</th>
<th>Residual BSM</th>
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<tbody>
<tr>
<td>10.5 months</td>
<td>30%</td>
<td>26.6%</td>
</tr>
<tr>
<td>4y 7.5 months</td>
<td>32.8%</td>
<td>15.8%</td>
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Histological examination
• a directed, well vascularized bony tissue with close contact to the individual BSM particles was seen with only superficial resorption signs.
• Osteoinduction into small porous structures with establishment of osteons.
• After 10.5 months, an active bone regeneration with all signs of desmal ossification could be observed.
• After 55.5 months a de facto completed ossification with uniformly directed lamellar bone was detected.

Conclusions
• 2 rare cases of human long-term biopsies of a xenogenic BSM.
• Completed bony integration with a high biocompatibility and excellent osteoconductive properties (osteones in inner pore porous structures of the BSM).
• No extensive resorption of the BSM particles.
• Differences between the two time points (immature vs. mature bone).