

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.

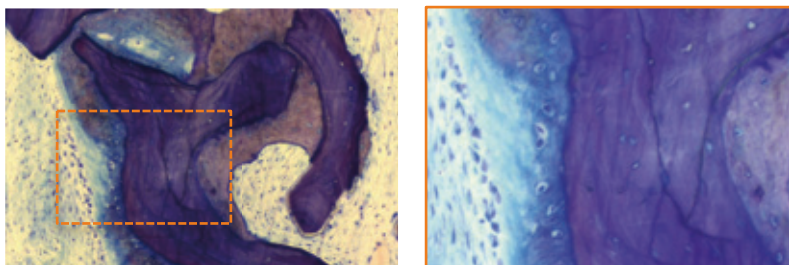


Results (for both investigated specimens)

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

Histomorphometric data

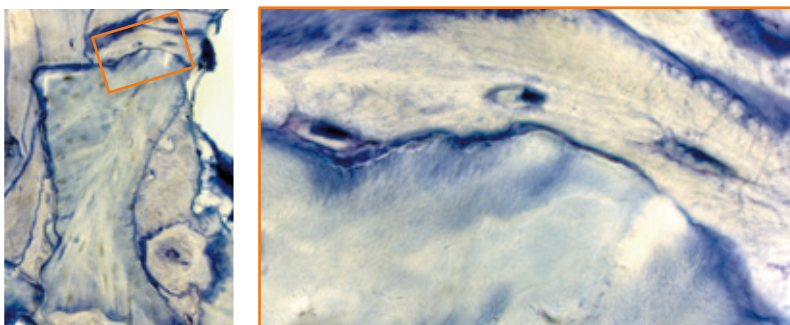
Specimen Age	New Bone	Residual BSM
10.5 months	30%	26.6%
4y 7.5 months	32.8%	15.8%



Biopsy after 10.5 months: the Bio-Oss® particles appear violet, new formations of immature osteoid appear bluish (left aspect of magnification: desmal ossification with pre-osteoblasts and synthesizing osteoblasts); mineralized mature bony tissue appears brownish with clearly detectable osteocytes (right aspect of magnification).

Histological examination

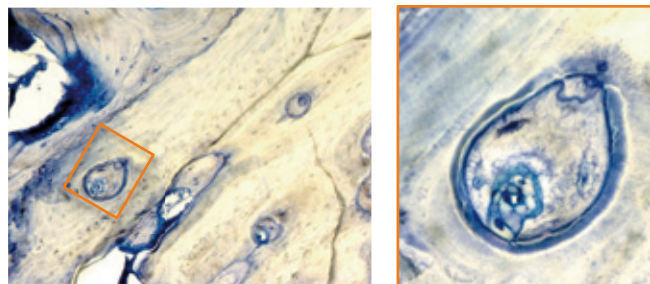
- a directed, well vascularized bony tissue with close contact to the individual BSM particles was seen with only superficial resorption signs.
- Osteoconduction into small porous structures with establishment of osteons.
- After 10.5 months, an active bone regeneration with all signs of desmal ossification could be observed.
- After 55.5 months a de facto completed ossification with uniformly directed lamellar bone was detected.



Biopsy after 4 years 7.5 months: the Bio-Oss® particles appear greenish, directed mature lamellar bone is seen in close contact. Almost no signs of active new bone formation can be 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 (osteons 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).



Biopsy after 4 years 7.5 months: detailed aspect of an osteon within a Bio-Oss® pore with central vessel, peri-vascular cells and osteogenic cells.