CERASORB® is the product of choice for successful bone augmentation in numerous dental, oral & maxillofacial and periodontal practices.

CERASORB® resorbs without residue during bone remolding and is replaced by natural bone → restitutio ad integrum, which is the main objective of bone regeneration.

Benefits that are appreciated worldwide!

Documented safety!
With over 135 scientific publications, CERASORB® is one of the best documented synthetic bone regeneration materials.

Saves you time!
Thanks to the synthetic nature of CERASORB® the patient education procedure is quick and simple.

More satisfied patients!
CERASORB® has more than 12 years of successful clinical experience.

CERASORB® - the development from 1970-2010

The history of β-tricalcium phosphate spans almost 40 years. The same scientists who were intensely involved in the early research in the field of biomaterials also contributed to the development of synthetic β-TCP, which was later developed into a successful biomaterial under the trade name CERASORB®.

In the early 1970’s, the first fundamental research was done in the field of synthetic bone augmentation at the Battelle Institute in Frankfurt, Germany. It soon became evident that β-tricalcium phosphate was superior to other materials. This lead to the development of the first prototypes of granular materials and blocks.

CERASORB® has turned into a product family that offers a suitable modification for various indications. All forms are optimized in regards to their functional surface area, porosity and resorption behavior.
2012

**Gruber A, Hübner WD (2012):**

“Prospective long-term study with 102 patients with the following indications: trauma, rheumatism, tumour. There were no allergic reactions or material-caused complications. In nearly all cases the long- term follow-up showed a complete osseointegration and resorption of Cerasorb®. Over the course of 10 years the synthetic bone graft Cerasorb® has proven to be an alternative to autologous spongiosa as bone void filler.”

**2011**

**Batista MA, Leivas TP, Rodrigues CJ, Arenas GC, Belitardo DR, Guarniero R (2011):**
Comparison between the effects of platelet-rich plasma and bone marrow concentrate on defect consolidation in the rabbit tibia.
Clinics (Sao Paolo) 2011; 66 (10): 1787-1792.

“20 rabbits with bone defects in the proximal tibia were randomly treated with β-tricalciumphosphate and PRP or BMC. After four weeks all animals showed good bone consolidation. The evaluation revealed a greater amount of consolidation and the formation of greater cortical bone thickness in the PRP group.”

The effect of BMP-2 on the osteoconductive properties of β-tricalcium phosphate in rat calvaria defects.

“Rat calvaria critical sized defects were treated with Cerasorb®, different other bone void fillers and autografts. The authors conclude that the osteoconductive properties of β-TCP Cerasorb® are superior to those of autografts and that TCP does not require BMP-2 supplementation.”

2010


“Five different β-tricalcium phosphate based bone substitute materials induced the formation of TRAP-positive multinucleated giant-cells as a sign of biomaterial stability. These cells directly influenced the vascularisation by secretion of VEGF as well as other chemokines.”

**Kebernik M, Palm F (2010):**
Die Sinusbodenelevation und ihre Risiken. [Sinus floor augmentation and its risks.]

“The application of autologous bone alone gives no advantage compared to a mixture of bone and bone regeneration material (Cerasorb® M) regarding implant survival rate.”

**2009**

**Berger S, Kaufmann MM, Siebert CH (2009):**
Knochenersatzstoffe bei Pfannenwechsel – ein verlässlicher Weg bei älteren Patienten? [Bone replacement materials in hip revision surgery – a reliable way in elder patients?]

“Also in elder patients synthetic bone void fillers can be used in hip revision surgery isolated or in combination with allogenic bone successfully.”

Perfusion culture of osteogenic induced mesenchymal stem cells on milled β-tricalcium phosphate (β-TCP) scaffolds. Poster presentation, 3rd CRTD summer conference on regenerative medicine, Dresden, 26.06.2009.

“Ceramic scaffolds from pure β-TCP with large interconnected channels are suitable for expansion and osteogenic differentiation of hMSC in vitro.”


“Mesenchymal stem cells from the bone-narrow of sheep were isolated and cultivated in vitro under a standardized procedure. It could be shown, that the mesenchymal the stem-cells as well as the chondrocytes could be cultivated on the scaffolds without any problem. Microporous TCP-implants are suitable for tissue-engineering.”


“The X-ray revealed complete or nearly complete degradation of the beta-tricalcium phosphate granules with concurrent bone substitution in the majority of cases in 12 months post grafting. The implants showed good stability 12 months after installation.”


“Individual implantable biomaterials as ready-to-use product, which is fast, direct and true to size implantable in a bone defect, are a further step in the development of easy and riskless bone regeneration.”


“22 patients showing contralateral intrabony defects were treated with β-TCP Cerasorb® alone or in combination with PRP. β-TCP is a satisfactory graft material in periodontal surgery, even without PRP.”


“In an in-vitro study with 6 different bone substitutes and 3 different cell lines, Cerasorb® showed very good cell viability factors with adherent and non-adherent cell cultures.”


“Clinical measurements showed preservation of alveolar width, and histologic analysis demonstrated both resorption of β-TCP (Cerasorb®) and conversion to vital alveolar bone. These characteristics make this graft material ideal for use after tooth extraction in conventional and implant dentistry.”


“The predictable formation of vital bone in the extraction sockets treated with β-TCP of this and other studies has led to 100 % success rates in implant placement and loading.”


“Of the various grafting materials studied, GB9/25 showed the best bone bonding and regenerative behaviour, closely followed by β-TCP.”

“1 micron-sized particles of pure β-TCP lead to a lower rate of particle-associated osteoclastogenesis and subsequent particle-induced inflammation and bone resorption than hydroxyapatite particles of the same size.”


“In 20 patients a total number of 33 sinus lift procedures by means of β-TCP Cerasorb® were performed. The mean postoperative follow-up was 4.5 years. The implant success rate was 97.6%.”


“In 29 patients an augmentation of sinus maxillaris with β-TCP or β-TCP and PRP was performed. The histomorphologic findings showed a progredient hydrolytic β-TCP degradation and cellular resorption of the ceramic fragments. The addition of PRP showed no difference.”


“Review on 40 years research and development of β-tricalciumphosphate and Cerasorb®.”


“β-TCP cylinders (10 x 6 mm, curasan AG) could be shown as ideal scaffolds for bone-narrow mesenchymal stem-cells.”


“Metaphyseal defects of the tibia head can be stabilized sufficiently with β-TCP, where β-TCP is osseointegrated dependent on the particle-size without negative impact on bone regeneration.”

2008


“Insoluble collageneous bone matrix followed by β-TCP Cerasorb® are the most suitable materials for bone tissue engineering regarding cell proliferation and phenotype. The embryonic stem cells have direct contact with the β-TCP. Especially on Cerasorb® M the cells seem to creep into the material.”

“2 groups of 10 patients each were treated with Cerasorb® and Cerasorb® M. After 6 months, bone formation and matrix mineralization were still actively progressing in the tissue surrounding the particles. In the Cerasorb® M-group, bone formation and particle degradation had already reached a more advanced stage.”


“In both granulate forms of Cerasorb®, a progresid growth of woven bone around and in particular in the granulates is to be seen (“creeping bony substitution”). Both Cerasorb® granulates are appropriate bone substitutes which are replaced by own bone tissue in a unique way.”

2007


“Treatment assessments of the 148 patients performed after 3 and 6 months showed continuous decrease of radiographically visible granulate, so that most implants could be placed between 4 to 6 months. Handling, efficiency and healing of the bone substitute were also assessed as good and very good in the vast majority of cases.”


“Sceletal defects in 11 dogs were treated with β-TCP Cerasorb® to enhance osseoregeneration. In 9 of 11 cases, complete osseous fusion occurred. In 8 cases complete biodegradation of the material became obvious within the observation period.”


“In 30 patients with different orthopaedic indications, Cerasorb® Granules and Block Forms were used as bone regeneration material. The results of the study show, that Cerasorb® is a alternative to the known clinically used bone substitutes because of its biocompatibility and resorption.”


“Cerasorb® M is suitable as a scaffold for human bone cells in an outstanding matter, whereas by proliferation and secretion of extra- cellular matrix a substantial tissue growth takes place in the scaffold.”


“Porous cylinders of β-TCP were loaded with osteogenetically differentiated mesenchymal stem cells and implanted into a critical-size defect of the femoral condyle of rabbits. After 3 months, osteogenesis took place and the typical extra-cellular matrix of bone, consisting mostly of inorganic bioapatite and organic collagen was formed.”

“In an in-vitro study, the formation of microcapillary-like structures containing a lumen by human dermal microvascular endothelia cells in coculture with human osteoblast cells and pure-phase $\beta$-TCP could be shown.”


“In the context of a surveillance study, the use of $\beta$-TCP for filling a larger mandibula defect after distraction-osteogenesis is reported. Despite a defect volume of 4 - 5 ccm, $\beta$-TCP could be used with a good result even without additional autologous spongiosa.”

2006


“The in vivo alkaline phosphatase activity of cell loaded Cerasorb® M ceramics was significantly higher compared with two other $\beta$-TCP ceramics.”


“The augmentation was performed with a combination of Cerasorb® M, fresh blood and PRP covered by the resorbable membrane INION. This procedure leads to good bone regeneration after 6 months.”


“A new bioresorbable membrane (INION) in combination with Cerasorb® M and PRP enables the placement of implants after sinus augmentation, even in cases where the residual bone height was to be considered borderline for single-stage procedure.”


“17 large jawbone defects were filled with 3 - 10 g Cerasorb® mixed with blood taken from the bone defect. After 36 - 60 months all bone defects healed uneventfully. Cerasorb® was almost completely resorbed and new bone building had occurred.”


“The production of synthetic tricalcium phosphate ($\beta$-TCP) allows excluding all disadvantages of biologically based ceramics. Moreover, the sintered pure-phase material ensures a high reproducibility without any organic residues of foreign matters.”


“The augmentation was performed with a combination of Cerasorb® M, fresh blood and PRP covered by the resorbable membrane INION. This procedure leads to good bone regeneration after 6 months.”


“The augmentation was performed with a combination of Cerasorb® M, fresh blood and PRP covered by the resorbable membrane INION. This procedure leads to good bone regeneration after 6 months.”

(Of the different biomaterials investigated, the macro porous β-TCP (Cerasorb® M) seems to be most suitable as scaffold for embryonal stem cells in bone tissue engineering.)


(“Due to the further development of modern bone substitute materials which reveal in part superior long-term results for special indications the routine use of autogenous bone has to be critically reviewed.”)


(The aim of the study was to investigate the long-term effect of the ceramic β-TCP at different sites of alveolar reconstruction and to evaluate its properties in 152 patients up to 52 weeks postoperative. Complete radiological replacement of β-TCP by autologous bone was found after approximately 12 months, indicating its osteoconductive properties.)

Presentation at the “Deutscher Kongress für Orthopädie und Unfallchirurgie”, Berlin, Germany, October 04, 2006. Abstract in German

(“The pilot-study showed the complete degradation of β-TCP-granules within 23 weeks in 4 cm long tibia-segment-defects in adult alpine sheep.”)


(“This synthetic bone regeneration material is an alternative to autologous spongiosa in the filling of bony defects. After complete resorption, this material leads to a “restitutio-ad-integrum”. The advantage is the low rate of complications compared to autologous spongiosa in the mouth.”)


(“Porous β-TCP as block forms or granules is a suitable bone replacement material for augmentation of metaphyseal defects after tibia head fractures.”)

“In all cases, bone defects were filled with β-tricalcium phosphate (Cerasorb®) and immediate loading was performed with the goal of improving implant survival. After up to 4 years of clinical follow-up 1039 implants (97%) survived.”


“...showed to be an ideal synthetic material with a porosity concerning body’s own spongiosa for use in the dental practice.”


“Especially defects where surgeries have a longer planning horizon can be treated with custom-made patient individual implants. Two different techniques for making such implants from β-TCP with 3-dimensional fabrication methods were experimentally realised and estimated.”


“From a study, which has been conducted with 72 patients, a number of 10 patients could be examined after 3 years. The results of the 3 years showed a good stability of all implants as well clinically as well radiologically.”


“In an open evaluation with 289 patients Cerasorb® M showed to be an ideal synthetic material with a porosity concerning body’s own spongiosa for use in the dental practice.”


“Cerasorb®, Cerasorb® M respectively, showed after 3 - 6 months regularly a good resorption and in relation to time and the individual situation of the patient a very good osseointegration of the dental implants.”


“With the β-TCP materials Cerasorb® and Cerasorb® M, materials with highest phase-purity are available, which proved their value in the daily practice as well in common situations as well in difficult indications.”

“In 17 edentulous patients, the maxilla sinus floor was extremely atrophied, which was surgically elevated bilaterally by insertion of Cerasorb® or autogenous bone graft. After 6 months, the new bone density was not significantly different. The augmented sinus floor was strong and suitable for anchorage of dental implants.”


“14 patients with 18 large defects of a diameter over 4 cm were observed over 5 years. In all cases, the filling with pure β-TCP Cerasorb® was sufficient for a complete biological remodelling.”

2005


“A procedure concerning the protocol forms an augmentation complex from the synthetic inorganic material with which even large bony defects can be treated successfully and implants can be placed immediately or promptly.”


“Examined was the influence of different inorganic and xenogenic bone supplements on adhesion, proliferation and differentiation of bone marrow cells, osteoblasts and osteoblast like cells. The cell growth on Cerasorb® was significantly higher for all cell types than control.”


“The resorption of the alveolar bone after extraction of teeth is considerably less due to simultaneous augmentation of the alveoli with Cerasorb® and the use of non-resorbable (TefGen) or resorbable (Epi- Guide) membranes as barriers on the extraction alveolus. The tolerability of the described procedures and materials is clinically evaluated as good to very good. Thus, this method can be recommended if a maximum preservation of the alveolar bone is essential, particularly for prosthetic reconstructions or because of aesthetic reasons.”


“In a field study it could be shown that after the application of Cerasorb® and of an appropriate membrane technique the alveolar crest could be maintained.”
Motsonelidze NR, Okropiridze TV, Kapanadze RV (2005):
[Usage of Cerasorb in Complex Treatment of Chronic Generalized Periodontitis (Clinical-Experimental Study)].
“Cerasorb® was used in the treatment of chronic generalized periodontitis. After 18 months the bone regeneration, confirmed by radiography, was shown in 87.8%, and only 60.1% in the control group. Cerasorb® can be recommended for using in the clinical practice.”

Palti A, Hermann F (2005):
Die geschlossene Sinusbodenelevation. Eine retrospektiv-röntgenologische Studie auf der Basis von 204 Implantaten zur Beurteilung der Veränderung der erzielten Augmentationshöhe.
[Closed sinus floor augmentation. A retrospective radiological study based on 204 implants to evaluate the change of the achieved augmentation height.]
“Sinus floor elevation has been performed in 104 patients, radiological follow-up was up to 24 months. An augmentation height of 2-4 mm could be reached in 44.1%, of 4-6 mm in 35.3% of the patients. The survival rate of all controlled implants was 96.1% within 2 years.”

Peters F, Hniopek T, Hasanovic K (2005):
Mechanische Charakterisierung von granulären Knochensatzmaterialien. [Mechanical characterization of granular bone substitutes.]
Biomaterialien 2005, 6 (3): 244 (Poster). Poster in German.
“Abrasions tests showed that the fine particles spectra are far away from the area which underlays phagocytosis. This shows that the material has no risk for an inflammation of the surrounding soft tissue in case of mechanical disintegration.”

“In a multiphase denture reconstruction Cerasorb® and Cerasorb® M were used in sinus floor elevation. After 4.5 months growth of new built bone was seen between the granules and on the outer and inner surface as well as a smooth transition of the granulate to matrix of woven bone tissue.”


“Mesenchymal stem cells were seeded into porous β-TCP (Cerasorb®)- cylinders and subsequently implanted into the femoral condyle of rabbits. The stem cells differentiate into osteoblasts and, while new bone material is produced by these cells, β-TCP is partially resorbed.”


“210 sinus grafts were performed in 188 patients and 494 implants placed in the region of interest. When used β-TCP alone or in combination with autologous bone implant survival rates were up to 98%. Resonance frequency analysis delivered identical osseointegration levels for these areas as obtained in implants placed in local D2 bone.”


“Bilateral sinus grafting was performed on 20 patients. Cerasorb® only was used on the experimental side, and autogenous bone only on the control side. Histologically and histomorphometrically, there was no significant difference between Cerasorb® and autogenous bone in terms of quantity and rate of ossification.”


“Bilateral sinus grafting was performed simultaneously – β-TCP (Cerasorb®) randomly on one side, autogenous bone on the other side. The implants were placed after 6 months: The formation of new bone was similar on both sides.”


“The new bone production was similar on both sides. The difference between the two sides was not significant. These results support the view that β-TCP can be a satisfactory graft material even without the addition of autogenous bone.”


“To achieve a perfect restoration, “ridge-preservation-technique” is performed with β-TCP Cerasorb® M and a non-resorbable membrane (TefGen). The implants are placed after 4-5 months – as well after the loss of a single tooth as well after the loss of a number of teeth in the front tooth region.”

“The results of the present study show that the sinus floor elevation procedure with β-TCP appears to be a reliable two phase procedure. Within the one year of follow-up no implant losses or failures had occurred.”


“The case descriptions show that today with modern augmentation and membrane techniques (Cerasorb®, TefGen-membrane) it is possible to treat even extreme cases without putting too much strain on the patient but effective and successful, without additional and unnecessary risks by additional operations.”


“After the preparation of the Schneiderian membrane with special osteotomes a gelatine sponge (Stypro®) is inserted followed by the augmentation with pure-phase β-tricalcium phosphate Cerasorb®. This procedure protects the Schneiderian membrane and improves the healing process. No complications have been observed.”


“Due to the risk of possible transmission of prions causing bovine spongiform encephalopathy and Creutzfeld-Jakob Disease by using xenografts based on bovine material and with a view to its osteoinductive power, synthetic bone regeneration materials of pure phase β-TCP are a reasonable alternative.”

2004


“Complete bone healing was established in all grafted defects. However, at 24 months β-TCP particles were completely resorbed, whereas Inorganic Bovine Bone (IBB) particles still occupied a remarkable area fraction without significant resorption beyond 6 months.”


“The results demonstrate that β-TCP graft material (Cerasorb®) has no adverse effect on cell count, viability and morphology, and this material provides a matrix that favours limited cell proliferation.”


“The split-crest surgical technique is a valid reconstructive procedure for sharp posterior mandibular ridges. If performed using platelet-rich plasma and Cerasorb®, it can shorten the osseointegration period.”
Hoch D (2004):
Verkleinerung von Ohrradikaloperationshöhlen mit phasenreiner β- Tricalciumphosphatkeramik.
[Reduction of radical ear surgery cavities with pure-phase β-tricalcium phosphate.]
Dissertation, Ruhr-University Bochum, Germany 2004, 1-70. Text in German.

“The histologic specimen show a large zone of newly formed bone. In those areas, which are not filled with newly built bone so far, β-tricalcium phosphate Cerasorb® has the function of a placeholder serving as a scaffold and guide rail for the bone regeneration. … 37 patients (86% success rate) were free of symptoms. Thus the aim of treatment was reached …”

Synthetische, phasenreine Beta-Tricalciumphosphat-Keramik (Cerasorb) zur Knochenregeneration bei der rekonstruktiven Chirurgie der Kiefer - Eine klinische Langzeitstudie mit Literaturübersicht.
[Synthetic, non-reactive beta-tricalcium phosphate-ceramic (Cerasorb) for bone regeneration in the reconstructive surgery of the jaws. A clinical long term study with review of literature.]

“A complete replacement of β-TCP-ceramic by autogenic bone could be proven radiologically after approx. 12 months. Because of its universal usability and low complication rate synthetic, non-reactive β-TCP-ceramic presents as an excellent alternative also for bigger bone defects as a supplement to autogenic spongiosa transplants.”

Hotz W (2004):
Retrospektive Fallstudie zum Sinuslift mit Cerasorb® und PRP. [Retrospective Case Study – Sinus Lift with Cerasorb® and PRP].

“Augmentation with the bone regeneration material Cerasorb®, with and without addition of PRP, is a convenient and reliable method for both the dental implantologist and his patients, where an adequate implant bed is created from vital autologous bone within a reasonable amount of time.”

Biocompatibility and Osseointegration of β-TCP: Histomorphological and Biomechanical Studies in a Weight-Bearing Sheep Model.

“It can be concluded that β-TCP block material in a weight bearing implantation model showed good biocompatibility, osseointegration and beginning degradation, even though it was not further degraded between 6 and 12 months.”

Kovacs K, Szabo G (2004):
[Clinical experience on dental preservation operations applying combined synthetic osteogenetics (β-tricalcium phosphate) and platelet-rich plasma].

“Due to the excellent results with beta-tricalcium phosphate (Cerasorb®), PRP and their combination in bone reconstruction, this technique should fast spread in small animal veterinary practice.”

Ormianer Z, Palti A (2004):
Dentinogenesis Imperfecta – ein seltener Fall aus der Praxis.
[Early implantation to avoid bone loss.]
Implantologie Journal 2004, 2: 6-10. Article in German.

“Successful augmentation with β-TCP (Cerasorb®) combined with blood and PRP. Four months later placing of implants. Excellent result.”

Peters F, Reif D (2004):
Functional Materials for Bone Regeneration from Beta-Tricalcium Phosphate. Funktionelle Materialien zur Knochenregeneration aus Beta-Tricalciumphosphat.
Mat.-wiss. u. Werkstofftech. 2004, 35 No. 4: 203-207. Article in English.

“β-TCP bioceramics have remarkable differences. Today different morphologies of the synthetic β-TCP bone regeneration material Cerasorb® for different applications are available for reaching the goal of complete bone regeneration.”
Alveolar bone regeneration stimulated by a combination of platelet-rich plasma and Cerasorb graft in beagle dogs: Histological and histomorphometric studies.

“Bilateral extraction alveoli of the premolars in 12 dogs were filled up with a combination \(\beta\)-Tricalciumphosphate Cerasorb\textsuperscript{®} and PRP or Cerasorb\textsuperscript{®} alone. After 6 weeks the newly formed bone was significantly denser on the \(\beta\)-TCP/PRP side. After 12 weeks this difference became moderate, after 24 weeks the bone forming activity was nearly equal on both sides. Cerasorb\textsuperscript{®} and PRP result in more intense bone regeneration, especially in the early phase.”


“Twenty-four weeks after grafting, bone-forming activity was nearly equal in the two groups (\(\beta\)-TCP with and without PRP), and the bone area in the two groups did not differ significantly (62.9% and 61.9% resp.).”


“After 6 months, insertion of the beta-tricalcium phosphate graft resulted in formation of stable bony bed apt to anchor of dental implants.”

Tadic D, Epple M (2004):
A thorough physicochemical characterisation of 14 calcium phosphate-based bone substitution materials in comparison to natural bone.

“14 different bone graft materials were investigated and the results were compared to synthetic hydroxyapatite and natural bone samples… Cerasorb\textsuperscript{®} is the only phase pure \(\beta\)-TCP of the tested \(\beta\)-TCP’s.”


“A study of the frequencies of failures (graft material resorption and implant loss) after 810 maxillary sinus elevations with various graft materials or their combinations was conducted. Concerning the rate of loss of implants, the most favourable results were achieved with \(\beta\)-TCP alone or together with autogenous bone.”


“At one year after the intervention, the site of the augmentation with \(\beta\)-TCP was in all cases occupied by hard tissue of good quality. The speed of remodeling seemed to be the fastest when the mixture of \(\beta\)-TCP and PRP was used.”


“Defects in the mandibles of beagle dogs were filled on one side with \(\beta\)-TCP alone, on the other side with a mixture of \(\beta\)-TCP and PRP (from autologous blood). After 12 weeks new bone formation was significantly greater, when PRP was applied.”

Zerbo IR, Zijderveld SA, de Boer A, Bronckers AL, de Lange G, ten Bruggenkate CM, Burger EH (2004):

“Cerasorb\textsuperscript{®} is an acceptable bone substitute material for augmentation of the maxillary sinus. Due to its osteoconductive but not osteoinductive properties the rate of bone formation is somewhat delayed in comparison to autologous bone.”

“In conclusion, this study confirms the hypothesis based on our earlier work that the cells infiltrating around and within the TCP material are osteogenic. The data suggest that the mechanism of degradation of the material is likely to be due to chemical dissolution and that the role played by osteoclasts is only minor.”

2003


“After 6 weeks guided bone regeneration utilizing Gore-Tex augmentation material and TCP (Cerasorb®) bone grafts resulted in the formation of viable new bone in calvarian defects in 8 rats.”


“The addition of PRP to the graft material seems to have a positive influence on the early wound healing after regenerative access flap surgery in intrabony defects.”


“... the extraction socket was filled with β-TCP ceramic (Cerasorb®). Radiographs taken ... after 6 months showed no periodontal or periapical lesions. No signs of external resorption were identified.”


“118 sinus augmentations have been performed on 83 patients using particulate alloplastic augmentation material (tricalcium phosphate) with various amounts of autogenous bone and blood. Mean augmentation height was 8.6 mm.”


“Symmetrically formed defects in the tibial bone of 21 rats were filled with β-TCP Cerasorb® or Bio-Oss®. Microscopic examination revealed the areas filled with Cerasorb® showing an increased rate of bone remodeling when compared to Bio-Oss®. Moreover, Cerasorb® implanted area resorbs earlier than the Bio-Oss® filled regions in the long term.”


“The pure-phase β-Tricalciumphosphate Cerasorb® together with autogenous bone at a ratio of 4:1, in combination with patients’ own PRP for a vertical augmentation of completely atrophied maxillae, resulted in an advancement of 14 to 16 mm. After a period of 8 months the β-TCP was completely resorbed and the X-ray control showed no residual granules in the defect sites.”


“Bone regeneration was more effective (in the beagle dog) when thrombocyte suspension and β-TCP were applied simultaneously than the single application of β-TCP.”

“Two teeth were removed symmetrically from each side of the mandible of 12 Beagle dogs; the resulting cavities were filled on one side with β-TCP alone, on the other side with a mixture of β-TCP and PRP (from autologeous blood). In week 12 new bone formation was significantly greater, when PRP was applied.”


“In the treatment of a non-erupted first premolar mandibular tooth (of a dog) the osteoinductive bone substitute β-TCP (Cerasorb®) was used, which is rarely used in veterinary medicine so far. This substance may be useful for bone substitution in small animal practice.”


“Cerasorb® is “golden standard” among the bone regeneration materials.”


“Major augmentation of the maxillary sinus was performed with a mixture of β-TCP (Cerasorb®), PRP, and autologous bone tissue. All patients were successfully treated with formation of high quality bone tissue, which subsequently enabled optimal osseointegration of the implants inserted. In consequence the surgical trauma undergone by the patient is markedly reduced.”


“Examination of implant survival rates in augmented sinus lift areas in 211 cases: Hip spongiosa and hip spongiosa + Cerasorb® and hip spongiosa + Ceros HA® were used as augmentation material. Only at implants inserted in Cerasorb® there was no loss of implants.”


“The histological evaluation of the biopsies displayed significantly more mature bone formation for the sites treated with β-TCP and PRP and β- TCP alone, followed by autogenous bone graft. The two sites filled with DFDBA and bovine bone graft displayed decreasing amounts of bone formation in the order of mentioning.”


“The pure beta-TCP was resorbed simultaneously with new bone formation, without interference with the bone matrix formation. Cerasorb® proved to be resorbable in 6 months without interference with the new bone matrix formation.”

“The materials utilized for the reconstruction of facial bone defects must satisfy various requirements. Augmentation was carried out with beta- TCP following the removal of a fibromyxoma. One year after the intervention, the site of the augmentation was occupied by hard tissue of good quality. The material satisfied the demands of transformation into bone (remodeling).”

Velich N, Toth Ch, Szabo G (2003):

“In a survey of the causes of the lack of success (graft loss and implant failure) of sinus elevations with various graft materials or their combinations, Cerasorb®/Cerasorb® PRP had the best outcome.”

2002

Gruber AA (2002):

“β-TCP Cerasorb® was used in 50 patients with bone tumors in fracture reconstruction and in inflammatory rheumatic joint deseases. β-TCP showed a complete resorption and growth of new bone with biomechanic results in terms of real remodelling.”

Hoch T (2002):

“Cerasorb® mixed with blood and in combination with PRP or together with different membranes is easy to use in the daily practice and has a high degree of safety concerning the quality of bone in the later augmentation site. It is very well accepted by the patients especially as no second operation is needed to harvest autogenous bone and because of its biological compatibility.”


“The unpleasant phenomena accompanying the removal of the patients own bone can be avoided through the use of a new synthetic material. Accordingly, when comparing the present results with the findings of other authors, β-tricalcium phosphate may be considered a good graft material even without autogenous bone.”


“We have treated almost 1000 bony defect sites in 267 patients with the bone regeneration material Cerasorb®. Being resorbed simultaneously with the formation of new bone, it is completely replaced by the patient’s own vital bone within 6 to 12 months.”

Palti A (2002):

“The pure-phase β-tricalcium phosphate Cerasorb® fulfils all requirements which to be termed “bone regeneration material” instead of “bone substitute material”. It is resorbed simultaneously with the formation of new bone without any residue, thus providing the patient with own vital bone for implant insertion, the stabilization of adjacent teeth or just for aesthetic reasons.”

Palti A (2002):

“Six to twelve months after the use of Cerasorb® the patient has vital bone at the implantation site. The time of regeneration depends on the patient’s individual metabolism and the careful following of the operation protocol by the dentist (freshen of the bone, mixing with blood, using a membrane).”
Erste Ergebnisse des Einsatzes von Cerasorb zur Auffüllung
von Knochendefekten an der Hand.
[Initial Results of Using Cerasorb to Fill Bone Defects in the Hand.]
Poster presentation, 43rd DAH Symposium, Vienna 2002.
Poster in German.

“If the goal of treating of a bone defect is a rapid,
unlimited and cost-effective restoration of the hand’s functions, Cerasorb® seems to be superior to cancellous bone.”

Degradation Characteristics of α and β Tri-Calcium-
115-121.

“The β-TCP material shows an accelerated degradation mode and has an optimal reactivity with the surrounding tissues. Compared to α-TCP the smaller-dimensioned β-TCP granules led to a finer architecture of the newly formed bone trabeculae, resulting in an early biofunctional adaptation of the bone substitute during the regeneration process.”

2001

Bilk D (2001):
Sinuslift und modifiziertes Übertragungssystem. Die
Versorgung einer verkürzten Zahnreihe im rechten
Oberkiefer mit Hilfe von zwei ITI-Implantaten.
[Sinus lift and modified transfer system. The treatment of
a shortened row of teeth in the right maxilla using two ITI
implants.]
Starget 2001, 4: 18-19. Article in German (also available in
English).

“It was possible to incorporate a denture after a period of
only four months despite of only bone height of approx.
5 mm and an open sinus lift. This is considerably shorter
than the times that have been usual hitherto with such
operations.”

Bilk D (2001):
Synthetisches Knochenaufbaumaterial in Kombination mit
autologen Wachstumsfaktoren und Stabilisierung durch eine
Titanfolie – Kasuistiken.
[Synthetic bone augmentation material in combination with
autologous growth factors and stabilisation by a titanium foil
– case reports].

“Even larger defects can be regenerated successfully
without the amendment of autologous bone with
Cerasorb®, a pure-phase β-TCP ceramic, patients own
PRP and stabilization of the augmentation material with a
titanium foil.”

Utilisation du Substitut Osseux β-Phosphate Tricalcique.
Étude préliminaire. - À propos d’un matériau de
comblement.
Le Chirurgien-Dentiste De France No. 1055. 6 Dec 2001:
29-33.

“In 72 patients with different indications the transformation of the implanted beta-TCP into bone was complete after 12 months. Load-bearing tissue had already developed after 4-6 months. The study showed that autologous bone is not necessary for sinus grafting or the filling of cysts: beta-TCP alone is suitable for this purpose.”

Bilk D (2001):
Augmentieren mit thrombozytenreichem Plasma (PRP)
und CERASORB® - Eine erfolgreiche Kombination in der
Implantologie.
[CERASORB® and PRP – a Successful Combination in
Augmentative Implantology.] Oralchirurgie Journal 2001, 2:
12-19. Article in German (Translation in English available).

“The cases presented in this article document the
successful use of the Cerasorb®-PRP-complex in sinus
floor and alveolar crest augmentation. The resorption
rate of Cerasorb® is synchronous with bone remodeling.
Cerasorb® therefore is not a bone substitute but a bone
regeneration material.”
Iglhaut G (2001):
Die Atrophie des Alveolarknochens nach Zahnextraktion verhindern. [To avoid the atrophy of the alveolar crest after teeth extraction.]

“The combination of $\beta$-TCP Cerasorb$^\text{®}$ and PRP forms an augmentation complex that regenerates vital bone at the defect site. The alveolar ridge preservation technique with Cerasorb$^\text{®}$ and PRP should be used as standard treatment after teeth extraction.”

Kisters GJ (2001):

“In combination with TefGen membranes the bone regeneration material consisting of pure-phase $\beta$-TCP (Cerasorb$^\text{®}$) mixed with blood from the defect and autologous bone has an osteoconductive effect and is totally resorbed. The risk-free use, the osteoconductive effect of the material and the complete resorption are the essential advantages.”


“The interconnecting microporosity of the investigated special $\beta$-TCP, which should be no smaller than 5 $\mu$m, resulted in faster degradation and micro-osseous conduction, and exhibited better tissue response toward the ceramic in comparison with $\alpha$-TCP.”

Anterior Cervical Interbody Fusion with new Titanium-Cages (WING$^\text{®}$).

“In combination with Cerasorb$^\text{®}$ no autologous bone had to be harvested, donor site morbidity could be avoided.”

Anterior Cervical Interbody Fusion with PEEK-Plate-Cages (Scient’x$^\text{®}$).

“After a follow-up of 6 or 12 months respectively, radiologically there was a 100% fusion rate. The Cerasorb$^\text{®}$-granules were completely resorbed.”

Cerasorb$^\text{®}$ und PRP in der regenerativen parodontalen und implantatunterstützten Therapie. [Cerasorb$^\text{®}$ and PRP in regenerative periodontal and implant-supported therapy.]

“The osteoconductive properties of Cerasorb$^\text{®}$ associated to its resorption rate over time and the osteoinductive properties of PRP implement new bone formation.”

Soost F (2001):

“Regarding the increase of the bone metabolism activity, the time-activity-curves of autogenous spongiosa and Cerasorb$^\text{®}$ are equally.”

Schmedtmann NO (2001):
Eine Methode zur sicheren und vorhersagbaren Knochenregeneration. [A method to obtain safe and predictable bone regeneration.]

“Through the combination of phase pure $\beta$-tricalcium phosphate Cerasorb$^\text{®}$ with autogenous thrombocyte concentrate PRP (platelet rich plasma), the regeneration of bone defects in the jaw region could be optimized and the algesia reduced.”

“Comparisons of the present results with the findings of other investigators demonstrated that β-tricalcium phosphate is a satisfactory graft material, even without autogenous bone.”

Wiltfang J, Schlegel KA, Merten HA (2001):
Klinische Ergebnisse nach Anwendung der resorbierbaren, phasenreinen β-Tricalciumphosphatkeramik Cerasorb® im enossalen Lager.
[Clinical results after application of resorbable, pure-phase β-tricalcium phosphate ceramic Cerasorb® in enossal bed.] ZWR 2001, 110 (9): 556-559. Article in German. (Translation in English available).

“Cerasorb® proved to be suitable in the treatment of the described lesions. Bony substitution occurred after 6-7 months in lesions up to 2 ml. In larger defects (up to 7 ml) bone substitution occurred after 12 months.”


“β-tricalcium phosphate is a useful implant material that encourages healing of bony defects and fractures. In keeping with the qualities required of a bone substitute, this material fulfills the role of a placeholder, forms a guide rail for osteogenesis and serves as a mineral depot.”

Zerbo IR, Bronckers AL, de Lange GL, van Beek GJ, Burger EH (2001):

“The data presented suggest that this graft material, possibly by virtue of its porosity and chemical nature, may be a suitable bone substitute that can biodegrade and be replaced by new mineralizing bone tissue.”

2000

Foitzik C (2000):
Anwendung und Erfahrungen mit phasenreinem β-Trikalziumphosphat in der Mund-Kiefer-Gesichtschirurgie.
[Application and experience with pure phase β-tricalcium-phosphate in oral and maxillo-facial surgery.] Article in German.
TraumaLinc 2000, 1: 74-80.

“In oral and maxillo-facial surgery, bony defects can be filled safe and with favourable results with the bone augmentation material Cerasorb®. Experiences with non- or purely resorbable hydroxyapatite ceramics were rather unfavourable in the long term.”

Kreusser B, Jakobs W (2000):
Wenn der Knochen nicht gut genug ist. Chirurgische Konzepte zur Verbesserung des Implantatlagers.
[If bone is not good enough. Surgical conceptions to improve the implant sites.] Implantologie Journal 2000, 4: 8-13. Article in German.

“Different correctional procedures enable the surgeon to substitute insufficient bone support by means of one stage or two stage surgery. The insertion of dental implants will keep their outstanding ranking only if the different build-up techniques are performed safely and responsible. In most cases Cerasorb®, a pure-phase β-TCP ceramic was successfully used.”

Histomorphologische Untersuchungen zum Resorptionsverhalten phasenreiner TCP- Keramiken im Tibiaedefekt des adulten Minipigs.
[Histomorphological examinations on the resorption of pure-phase ßTCP ceramics in tibia defects in the adult mini-pig.] Osteosynthese International 2000, 8 (Suppl. 1): 107-110. Article in German.

“Within 15 to 18 months Cerasorb®, the pure-phase ß-TCP ceramic, is entirely substituted by bone in an artificial marrow canal defect and, in an ideal way fulfills the requirements placed on an osteo-potent bone regeneration material.”

“Within 68 weeks Cerasorb®, a pure-phase β-TCP ceramic is completely degraded and substituted by bone. Histologically, RES-contamination with ceramic particles can be excluded. Clinically, the β-TCP ceramic Cerasorb® can be recommended for the filling of bone defects.”


“Thanks to its high biocompatibility and the fact that to some extent it forms a template for bone regeneration, β-tricalcium phosphate in the form of Cerasorb® is in many respects at least in value to autologous bone. Similarly, the success rate of 99% (with 50 patients) ... using Cerasorb® alone is comparable to that achieved with autologous bone. An additional benefit of this procedure is that it does not result in a second operation.

The osseointegration of the β-tricalcium phosphate was investigated histologically and radiologically. The rate of resorption of Cerasorb® was found to be the same as the rate of local bone regeneration. After six months the reconstructed trabecular architecture was considered on the basis of histological criteria to be suitable for insertion of a dental implant.”


“In 52 patients with different indications the transformation of the implanted beta-TCP into bone was complete after 12 months. Load-bearing tissue had already developed after 4-6 months. Studies suggest that autologous bone is not necessary for sinus grafting or the filling of large cysts: Cerasorb® alone is suitable for this purpose.”

1999


“Synthetic pure-phase β-tricalcium phosphate is of special interest among the available bone substitutes, as this material is fully resorbed and replaced by natural local bone within a reasonable period of time. The favourable clinical results with pure-phase β-TCP as bone substitute broaden the range of indications for treating periodontal bony defects.”


“Use of a combination of pure-phase β-tricalcium phosphate and resorbable membranes can lead to clinically favourable outcomes, even in high-risk procedures or where the risk of infection is high. Risks of immunological reactions and the transmission of pathogens are not inherently associated with synthetic pure-phase β-TCP.”


“The material is broken down fully and replaced with bone, e.g. when filling bone defects caused by tumors, when performing bone substitution for remodelling and fracture cases or to bridge or fill-in defects to achieve bone union.”


“The use of beta-tricalcium phosphate removes the need for additional surgery to obtain spongy bone, thus significantly reducing operation time. Cerasorb® is thus a highly suitable material for bone regeneration in the field of hand surgery and traumatology.”
Literature

Staus H, Foitzik C (1999): 
Implantatinsertion bei gleichzeitiger Augmentation des Kieferkammes. Fallbeschreibungen mit β-Tricalciumphosphatkeramik. 

“The disadvantage of transferring autogenous bone is obvious. The employment of a synthetic resorbable bone-replacing material (β-TCP, Cerasorb®) and its complete substitution by endogenic bone will exclude the transfer of pathogenic germs and any precarious immunoreaction.”

1998

Kreusser B (1998): 

“The use of Cerasorb® only is a safe procedure for sinus lifts. The quality of the augmented bone seems to render the addition of autologous cancellous bone superfluous. The material helps to generate the quantity and quality of endogenous bone material that is necessary for placing implants.”

1997

Foitzik C, Stamm M (1997): 
Einsatz von phasenreinem β-Tricalciumphosphat zur Auffüllung von ossären Defekten - Biologische Materialvorteile und klinische Erfahrungen. 
[The use of single-phase β-Tricalciumphosphate to fill osseous defects - Biological advantages and clinical practice.] 
Die Quintessenz, October 1997, 48 (10): 1365-1377, Reprint, Article in German.

“The pure-phase β-TCP Cerasorb® has been used in 86 cases. After a follow-up period of 20 months, X-ray examination showed an improvement of the clinical findings in nearly all patients.”