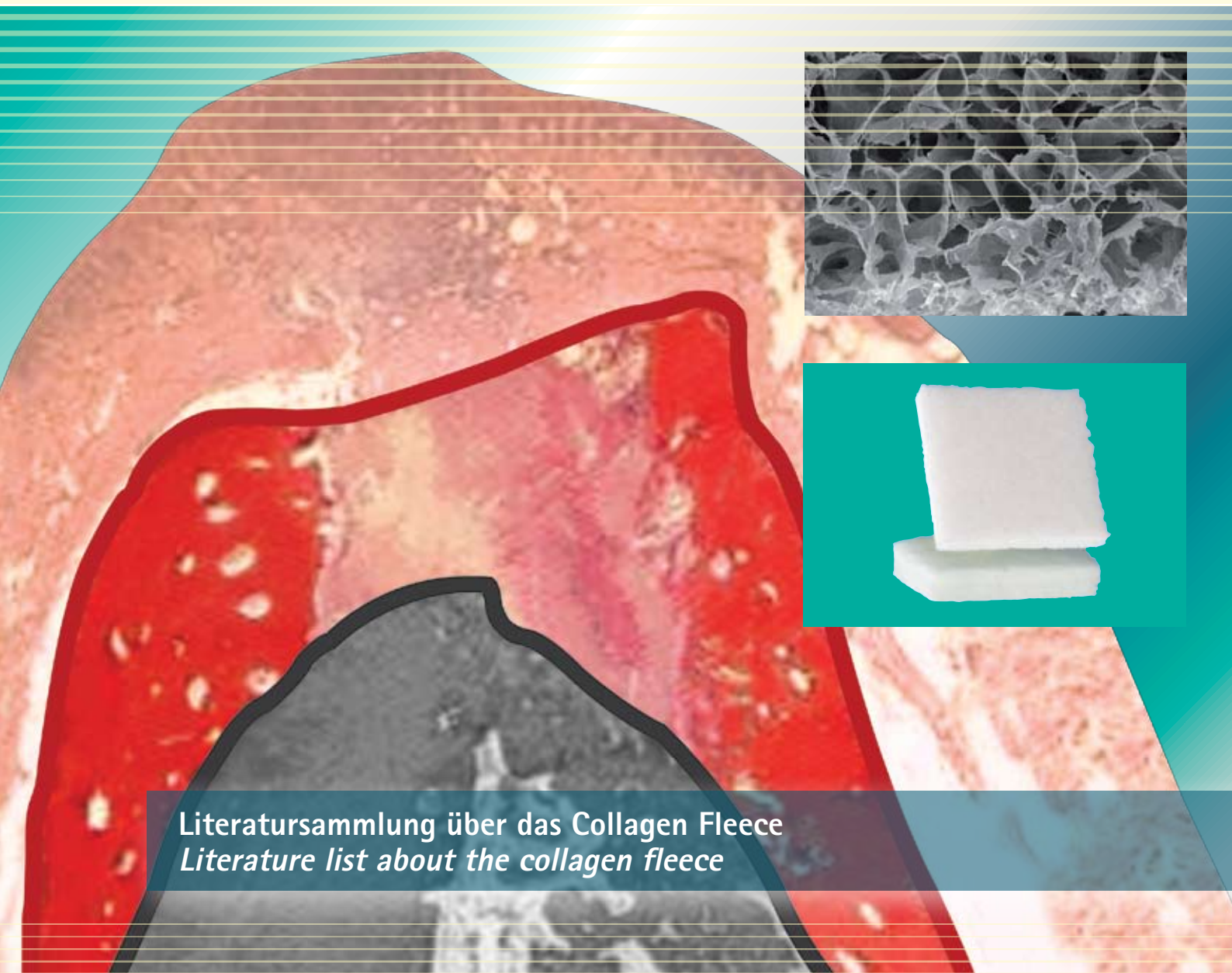


**Veröffentlichungen**  
*Published Papers on*



Literatursammlung über das Collagen Fleece  
*Literature list about the collagen fleece*

# SOLUTION

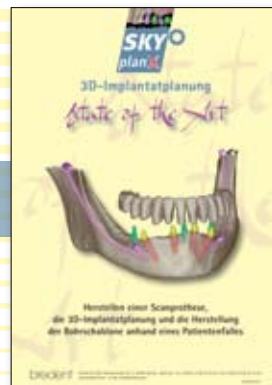
Lösungen für die orale Rehabilitation ... bredent group



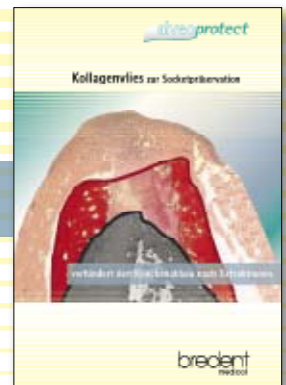
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REF 000 298 OD



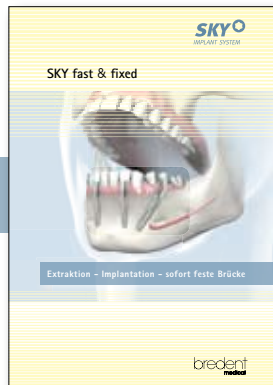
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alveoprotect  
REF 000 306 OD



whiteSKY  
REF 000 168 OD



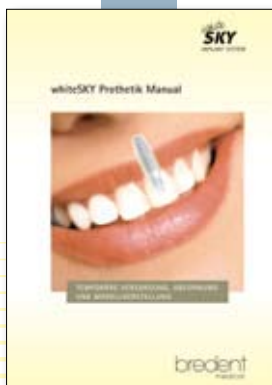
SKY fast & fixed  
REF 000 200 OD



Systemvorstellung SKY  
REF 000 250 OD



ossceram nano  
REF 000 301 OD



whiteSKY Manual  
REF 000 288 OD



SKY uni.fit  
REF 000 280 OD



SKY esthetic line  
REF 000 267 OD



UVE  
REF 000 169 OD

# ***alveoprotect***

## **Eine Analyse veröffentlichter Literatur über das Collagen Fleece**

Seite 4

## ***A analysis of published papers about the collagen fleece***

Page 5

**Dr. Jörg Neugebauer, Universität Köln / University of Cologne**

[Dr. Jörg Neugebauer, Universität Köln](#)

Eine Literaturanalyse mit den Suchbegriffen Kollagen in Kombination mit Wundheilung, Zahnextraktion und Knochenregeneration wurde durchgeführt.

Bei der Zahnextraktion wird nicht nur der Zahn sondern auch der Zahnhalteapparat entfernt, so dass neben dem Parodont auch der Bündelknochen, in den die Sharpeyschenfasern einstrahlen, verloren geht (7). Sofern der Alveolarknochen eine dünne Ausprägung zeigt, kommt es in der Folge zu einem Verlust vor allem des vestibulären Knochens und zu der bekannten Alveolarkamatrophie (12, 21).

Um dem Verlust des Alveolarfortsatzes nach Zahnextraktion vorzubeugen wird seit vielen Jahren das Auffüllen der Extraktionsalveole mit verschiedenen Materialien empfohlen (1, 6). Bei der Wundversorgung nach Zahnextraktion bei Patienten mit hämorrhagischen Diathesen haben sich Kollagene zur Propyhlaxe der Nachblutung empfohlen (8, 11, 17). Dabei zeigten sich keine Einschränkungen der Wundheilung durch das eingebrachte Material (16, 18, 20) und auch Anzeichen einer knöchernen Regeneration ohne Fremdkörperreaktion (15, 18, 19). In Zellkulturen und Tierversuchen konnte die Bedeutung von Kollagen für die Geweberegeneration nachgewiesen werden (2, 5).

Die knöcherne Regeneration der Extraktionsalveole erfolgt über die Formation der unterschiedlichen Kollagentypen (14). Dabei konnten in Studien zur Absicherung der BMP-Anwendung gezeigt werden, dass selbst die nicht mit BMP-dotierten Kollagenpräparate bei der Versorgung der Extraktionsalveole eine signifikante höhere Knochenneubildungsrate als die nicht versorgte Extraktionsalveole zeigte (9). Der Vergleich von verschiedenen Augmentationsmaterialien zeigte kein Unterschied zwischen autologen, demineralisierten gefriergetrocknetem oder anorganischem bovinen Knochen beziehungsweise Tricalzium-Posphat-Präparaten und Kollagenschwämmen bei der membrangeführten Defektregeneration (4).

Bei der Besiedelung mit parodontalpathogenen Keimen werden Kollagene schnell in der Mundhöhle abgebaut (10, 13), so dass bei nicht dotierten und/oder kreuzvernetzten Kollagen nicht von einer chronischen Infektion des Augmentationsmaterials ausgegangen werden muss, die bei einer Infektion zu einer bindegewebigen Einscheidung des verbleibenden Materials und somit eventuell zu einer Reduzierung der Qualität des Implantatlagers führen kann (3).

[Dr. Jörg Neugebauer, University Cologne/Germany](#)

A literature analysis using the search keys „collagen“ in combination with wound healing, tooth extraction and bone regeneration was carried out.

The term „tooth extraction“ does not only describe the removal of the tooth but also the removal of the periodontium so that, in addition to the periodontium, also the bundle bone into which the Sharpey's fibers reach is lost (7). If only thin alveolar bone is available, mostly loss of vestibular bone and common atrophy of the alveolar ridge will result (12, 21).

To prevent loss of the alveolar process following tooth extraction, filling of the extraction socket with various materials has been recommended for quite some years now (1, 6). As far as wound treatment following tooth extraction in patients with hemorrhagic diatheses is concerned, collagen fibers have been recommended for the prophylaxis of secondary hemorrhage (8, 11, 17). The inserted material (16, 18, 20) did not affect wound healing and there were also signs of bone regeneration without foreign-body reaction (15, 18, 19). The relevance of collagen for tissue regeneration could be proven in cell cultures and animal experiments (2, 5).

The formation of the different collagen types (14) caused osseous regeneration of the extraction socket. In studies on BMP use it could be demonstrated that even for non-BMP-doped collagen preparations a rate of bone regeneration could be observed for the treated extraction socket that was significantly higher than that of non-treated extraction sockets (9). The comparison of two different augmentation materials did not reveal any difference between autologous, demineralized freeze-dried or inorganic bovine bone respectively tricalcium phosphate preparations and collagen sponges in membrane-guided bone regeneration (4).

When colonizing with periodontal pathogenic bacteria, rapid collagen degradation in the oral cavity is observed (10, 13) so that in the case of non-doped and/or cross-linked collagen fibers chronic infection of the augmentation material is not to be expected, which may result in connective tissue encapsulation of the remaining material and hence possibly reduce the quality of the implant site (3) in the case of an infection.

## Literatursammlung über das Collagen Fleece

*Literature list about the collagen fleece*



[1. Ann Acad Med Stetin](#), 2008;54:70-81

**Alveolar ridge sockets preservation with bone grafting--review.**

[Allegrini S, Jr., Koenig B, Jr., Allegrini MR, Yoshimoto M, Gedrange T, Fanghaenel J, Lipski M.](#)

**Summary:**

**INTRODUCTION:**

Alveolar bone seems to play a key role in providing support to the teeth, which are anchored to the bone by desmodontal fibers. The progressive alveolar bone resorption process occurs due to a loss of anatomic, biologic and mechanical factors. Mechanical stimulation of alveolar bone during mastication is crucial in keeping the teeth and underlying bone healthy. Tooth extraction leads to typical bone deficiency of ridge width and height of alveolar crest and reduces the possibility of placing screw titanium implants. When tooth extraction is necessary, trauma should be minimized during the procedure and bone preservation should receive careful attention. The literature has shown that early bone loss can be significantly reduced by socket grafting. The process of socket grafting requires an understanding of wound healing and an appreciation of the biological properties of the products available for socket grafting. Augmentative measures may, thus, be required to guarantee optimal prosthetic replacement of the lost tissue. Success or failure of augmentation procedures is dependent on revascularization and remodelling of the grafted bone into a vital, load bearing bone. In contrast to a visible three-dimensional change, the concept of remodelling refers to the internal turnover of bone, which is a coupled process where osteoclastic resorption and osteoblastic formation are more or less balanced. To restore alveolar bone loss and support efficient placement of dental implants, many different bone substitute such as autografts, allografts, xenografts, synthetic biomaterials and osteoactive agents have been proposed. In order to avoid harvesting an autograft, and thereby eliminating additional surgical procedures and risks, bone grafting materials and substitutes are alternative filler materials to be used for ridge augmentation.

**PURPOSE:**

To present a literature review about biomaterials applicable in alveolar ridge sockets preservation to future implants insertion.

**CONCLUSION:**

The maintenance of the dental alveolar bone after extraction depend on the attentive surgery procedure and the use of materials capable to maintain the prior space and be helpful in bone tissue healing.

[2. Eur J Orthod](#), 2008;30:1-9

**Implantation of tissue-engineered mucosal substitutes in the dog palate.**

[Ophof R, Maltha JC, Kuijpers-Jagtman AM, Von den Hoff JW.](#)

**Summary:**

Tissue shortage complicates the surgery of cleft palate (CP) anomalies. The healing of defects on the palate impairs growth of the dento-maxillary complex due to scar tissue formation. Implantation of grafts into the wound area might reduce this adverse effect of surgery. The aim of this study was to evaluate a cultured autologous mucosal substitute, which can be used as a graft material. Two different types of cultured mucosal substitutes composed of skin-derived substrates (unprocessed dermis and AlloDerm) and autologous oral keratinocytes were implanted in palatal wounds in six beagle dogs (1-1.5 years of age). The cultured substitutes were compared with a sham and a control group. The animals were sacrificed in pairs 1, 3, and 12 weeks after surgery. Epithelial regeneration, inflammatory response (leucocyte protein L1), ingrowth of (myo-) fibroblasts, collagen type III, and formation of a basal membrane (JM 403) were evaluated. The results demonstrated that all cultured substitutes possessed a multilayered epithelium, closely resembling normal palatal epithelium. After implantation, however, the epithelium was lost and an inflammatory response was observed in the first week. After 3 and 12 weeks, the implanted substitutes had completely disappeared and epithelial migration occurred from the wound margins. It is possible to culture an autologous epithelium on a skin-derived substrate and implant it as an oral mucosal substitute in palatal wounds. However, these substitutes do not improve the healing of palatal wounds. It is suggested that the revascularization of the wound area is too slow to allow survival and integration of the substitutes.

[3. Int J Oral Maxillofac Surg](#), 2008;37:741-7

**Dimensional ridge alterations following socket preservation using a nanocrystalline hydroxyapatite paste: a histomorphometrical study in dogs.**

[Rothamel D, Schwarz F, Herten M, Engelhardt E, Donath K, Kuehn P, Becker J.](#)

**Summary:**

The aim of the study was to evaluate the histological response and dimensional ridge alterations following application of a nanocrystalline hydroxyapatite paste (NHA) into fresh extraction sockets in dogs. Immediately following vertical tooth separation and extraction, NHA was inserted in the extraction socket of the second molar in the lower jaws of 10 dogs. Untreated extraction sites on the opposite side served as controls. Wounds were closed using resorbable sutures after vertical flap elevation. After three and six months, 5 animals were killed. Lingual and buccal bone height, alveolar wall and total bone width 1, 3 and 5mm underneath the top of the crest were evaluated. Histological analysis revealed a high variability of NHA resorption and osteoconductive properties with different rates of material resorption. No statistically significant differences could be observed between the corresponding aspects of test and control sites. Both groups revealed higher alveolar wall resorption on the buccal than on the lingual side at both time periods. NHA does not seem to be useful for socket preservation procedures since it failed to prevent dimensional ridge alterations while revealing osseous integration but unpredictable material resorption. The role of non-resorbed hydroxyapatite remnants for implant placement is unclear and requires further investigation.

[4. Int J Periodontics Restorative Dent](#), 2007;27:287-94

**Osseointegration of titanium implants following guided bone regeneration using expanded polytetrafluoroethylene membrane and various bone fillers.**

[Fiorellini JP, Kim DM, Nakajima Y, Weber HP.](#)

**Summary:**

The purpose of this study was to evaluate the percentage of bone-to-implant contact following guided bone regeneration using expanded polytetrafluoroethylene (e-PTFE) membranes and various bone fillers in a beagle dog model. A staged approach was used for initial bone regeneration of surgically created defects and subsequent implant placement in newly regenerated ridges. Three months after bilateral extraction of the mandibular premolars and first molars, rectangular, distal-extension defects that included the entire width of the ridge buccolingually were surgically created in the alveolar processes. All defects were covered with an e-PTFE membrane, and several bone fillers were placed, in a randomized fashion, under the membrane: autogenous bone, demineralized freeze-dried bone, anorganic bovine bone, tricalcium phosphate granules, and collagen sponge. One site in each animal was treated with e-PTFE barrier membrane alone as control. Following an 8-month healing period, nonsubmerged titanium implants (36 total) were placed in regenerated bone following membrane removal. Three months later, the animals were sacrificed, and nondecalcified buccolingual sections were evaluated histometrically for bone-to-implant contact. All sites demonstrated high percentages (50% to 65%) of bone-to-implant contact, with no significant differences across the various treatment groups. In addition, all tested bone fillers formed a complex that supported and maintained the osseointegrated implants in a healthy state, with no apparent signs of peri-implantitis. Using a staged approach, the present study provided histologic and histometric evidence that implants placed in entirely regenerated bone can achieve and maintain osseointegration, regardless of the type of bone fillers used.

[5. In Vitro Cell Dev Biol Anim](#), 2007;43:49-58

**Transplantation of engineered bone tissue using a rotary three-dimensional culture system.**

[Hidaka M, Su GN, Chen JK, Mukaisho K, Hattori T, Yamamoto G.](#)

**Summary:**

Bone is a complex, highly structured, mechanically active, three-dimensional (3-D) tissue composed of cellular and matrix elements. We previously published a report on in situ collagen gelation using a rotary 3-D culture system (CG-RC system) for the construction of large tissue specimens. The objective of the current study was to evaluate the feasibility of bone tissue engineering using our CG-RC system. Osteoblasts from the calvaria of newborn Wistar rats were cultured in the CG-RC system for up to 3 wk. The engineered 3-D tissues were implanted into the backs of nude mice and calvarial round bone defects in Wistar rats. Cell metabolic activity, mineralization, and bone-related proteins were measured in vitro in the engineered 3-D tissues. Also, the in vivo histological features of the transplanted, engineered 3-D tissues were evaluated in the animal models. We found that metabolic activity increased in the engineered 3-D tissues during cultivation, and that sufficient mineralization occurred during the 3 wk in the CG-RC system in vitro. One mo posttransplantation, the transplants to nude mice remained mineralized and were well invaded by host vasculature. Of particular interest, 2 mo posttransplantation, the transplants into the calvarial bone defects of rats were replaced by new mature bone. Thus, this study shows that large 3-D osseous tissue could be produced in vitro and that the engineered 3-D tissue had in vivo osteoinductive potential when transplanted into ectopic locations and into bone defects. Therefore, this system should be a useful model for bone tissue engineering.

[6. Compend Contin Educ Dent](#), 2007;28:646-53; quiz 654, 671

**Socket preservation as a precursor of future implant placement: review of the literature and case reports.**

[John V, De Poi R, Blanchard S.](#)

**Summary:**

Dimensional changes after tooth extraction often result in bone resorption that complicates restorations with implant or traditional prostheses. Preservation of alveolar dimensions after tooth extraction is crucial to achieve optimal esthetic and functional prosthodontic results. In addition, with the increasingly frequent use of dental implants to replace nonrestorable teeth, preservation of the existing alveolus is essential to maintain adequate bone volume for placement and stabilization of the implants. Atraumatic extraction and socket preservation techniques have been introduced to minimize bone resorption after tooth extraction. This article reviews the literature, presents clinical cases on the healing of the alveolus and its dimensional changes after tooth extraction, and discusses socket preservation techniques that have been introduced to minimize these dimensional changes.

[7. Clin Oral Implants Res](#), 2006;17:606-14

**Modeling of the buccal and lingual bone walls of fresh extraction sites following implant installation.**

[Araujo MG, Wennstrom JL, Lindhe J.](#)

**Summary:**

**OBJECTIVE:**

To determine whether the reduction of the alveolar ridge that occurs following tooth extraction and implant placement is influenced by the size of the hard tissue walls of the socket.



#### MATERIAL AND METHODS:

Six beagle dogs were used. The third premolar and first molar in both quadrants of the mandible were used. Mucoperiosteal flaps were elevated and the distal roots were removed. Implants were installed in the fresh extraction socket in one side of the mandible. The flaps were replaced to allow a semi-submerged healing. The procedure was repeated in the contra later side of the mandible after 2 months. The animals were sacrificed 1 month after the final implant installation. The mandibles were dissected, and each implant site was removed and processed for ground sectioning.

#### RESULTS:

Marked hard tissue alterations occurred during healing following tooth extraction and implant installation in the socket. The marginal gap that was present between the implant and the walls of the socket at implantation disappeared as a result of bone fill and resorption of the bone crest. The modeling in the marginal defect region was accompanied by marked attenuation of the dimensions of both the delicate buccal and the wider lingual bone wall. Bone loss at molar sites was more pronounced than at the premolar locations.

#### CONCLUSION:

Implant placement failed to preserve the hard tissue dimension of the ridge following tooth extraction. The buccal as well as the lingual bone walls were resorbed. At the buccal aspect, this resulted in some marginal loss of osseointegration.

[8. ZM, 2006;96:38-44](#)

### Behandlung gerinnungsgestörter Patienten in der zahnärztlichen Praxis.

[Scheer M, Breuer K, Neugebauer J, Zöller JE.](#)

#### Summary:

Die notfallmäßige Behandlung von Nachblutungen sowie die Durchführung von zahnärztlich-chirurgischen Eingriffen bei Patienten unter gerinnungshemmender Medikation stellt für den niedergelassenen Zahnarzt eine Herausforderung dar. Die Behandlung von Patienten unter antikoagulatorischer Therapie hat sich in den letzten Jahrzehnten grundlegend geändert. Während früher eine Umstellung auf Heparin für selektive Eingriffe der besseren Steuerbarkeit wegen das Standardverfahren darstellte, haben neuere Studien zeigen können, dass bei Patienten unter Phenprocoumon eine Behandlung unter fortgesetzter oraler Antikoagulation möglich und sicher erscheint. Dies scheint nach aktuelleren Untersuchungen auch für die Behandlung mit niedrig dosierter Acetylsalicylsäure zuzutreffen. Für andere Thrombozytenaggregationshemmer, wie die ADP-Rezeptorantagonisten und die Kombination Dipyridamol/Acetylsalicylsäure sind derzeit noch keine kontrollierten Studien publiziert, jedoch wird von einigen Autoren ein ähnliches Vorgehen wie bei Patienten unter niedrig dosierter Acetylsalicylsäure propagiert. Da ADP-Rezeptorantagonisten (Clopidogrel) je nach Erkrankung nur für einen begrenzten Zeitraum eingenommen werden müssen, lassen sich gegebenenfalls elektive Eingriffe zu einem späteren Zeitpunkt durchführen. Unabhängig von der antikoagulatorischen Medikation wird von allen Autoren auf die Notwendigkeit einer suffizienten Lokaltherapie mit resorbierbaren Hämostyptika hingewiesen.

[9. J Periodontol, 2005;76:605-13](#)

### Randomized study evaluating recombinant human bone morphogenetic protein-2 for extraction socket augmentation.

[Fiorellini JP, Howell TH, Cochran D, Malmquist J, Lilly LC, Spagnoli D, Toljanic J, Jones A, Nevins M.](#)

#### Summary:

##### BACKGROUND:

Conventional dentoalveolar osseous reconstruction often involves the use of grafting materials with or without barrier membranes. The purpose of this study was to evaluate the efficacy of bone induction for the placement of dental implants by two concentrations of recombinant human bone morphogenetic protein-2 (rhBMP-2) delivered on a bioabsorbable collagen sponge (ACS) compared to placebo (ACS alone) and no treatment in a human buccal wall defect model following tooth extraction.

##### METHODS:

Eighty patients requiring local alveolar ridge augmentation for buccal wall defects (> or =50% buccal bone loss of the extraction socket) of the maxillary teeth (bicuspid forward) immediately following tooth extraction were enrolled. Two sequential cohorts of 40 patients each were randomized in a double-masked manner to receive 0.75 mg/ml or 1.50 mg/ml rhBMP-2/ACS, placebo (ACS alone), or no treatment in a 2:1:1 ratio. Efficacy was assessed by evaluating the amount of bone induction, the adequacy of the alveolar bone volume to support an endosseous dental implant, and the need for a secondary augmentation.

##### RESULTS:

Assessment of the alveolar bone indicated that patients treated with 1.50 mg/ml rhBMP-2/ACS had significantly greater bone augmentation compared to controls ( $P < \text{or} = 0.05$ ). The adequacy of bone for the placement of a dental implant was approximately twice as great in the rhBMP-2/ACS groups compared to no treatment or placebo. In addition, bone density and histology revealed no differences between newly induced and native bone.

##### CONCLUSION:

The data from this randomized, masked, placebo-controlled multicenter clinical study demonstrated that the novel combination of rhBMP-2 and a commonly utilized collagen sponge had a striking effect on de novo osseous formation for the placement of dental implants.

[10. Clin Oral Implants Res](#), 2005;16:369-78

**Biodegradation of differently cross-linked collagen membranes: an experimental study in the rat.**

[Rothamel D, Schwarz F, Sager M, Herten M, Sculean A, Becker J.](#)

**Summary:**

The aim of the present study was to compare the biodegradation of differently cross-linked collagen membranes in rats. Five commercially available and three experimental membranes (VN) were included: (1) BioGide (BG) (non-cross-linked porcine type I and III collagens), (2) BioMend (BM), (3) BioMendExtend (BME) (glutaraldehyde cross-linked bovine type I collagen), (4) Ossix (OS) (enzymatic-cross-linked bovine type I collagen), (5) TutoDent (TD) (non-cross-linked bovine type I collagen, and (6-8) VN(1-3) (chemical cross-linked porcine type I and III collagens). Specimens were randomly allocated in unconnected subcutaneous pouches separated surgically on the back of 40 wistar rats, which were divided into five groups (2, 4, 8, 16, and 24 weeks), including eight animals each. After 2, 4, 8, 16, and 24 weeks of healing, the rats were sacrificed and explanted specimens were prepared for histologic and histometric analysis. The following parameters were evaluated: biodegradation over time, vascularization, tissue integration, and foreign body reaction. Highest vascularization and tissue integration was noted for BG followed by BM, BME, and VN(1); TD, VN(2), and VN(3) showed prolonged, while OS exhibited no vascularization. Subsequently, biodegradation of BG, BM, BME and VN(1) was faster than TD, VN(2), and VN(3). OS showed only a minute amount of superficial biodegradation 24 weeks following implantation. Biodegradation of TD, BM, BME, VN(2), and VN(3) was associated with the presence of inflammatory cells. Within the limits of the present study, it was concluded that cross-linking of bovine and porcine-derived collagen types I and III was associated with (i) prolonged biodegradation, (ii) decreased tissue integration and vascularization, and (iii) in case of TD, BM, BME, VN(2), and VN(3) foreign body reactions.

[11. Eur Spine J](#), 2004;13 Suppl 1:S89-96

**The use of local agents: bone wax, gelatin, collagen, oxidized cellulose.**

[Schonauer C, Tessitore E, Barbagallo G, Albanese V, Moraci A.](#)

**Summary:**

The use of local agents to achieve hemostasis is an old and complex subject in surgery. Their use is almost mandatory in spinal surgery. The development of new materials in chemical hemostasis is a continuous process that may potentially lead the surgeon to confusion. Moreover, the more commonly used materials have not changed in about 50 years. Using chemical agents to tamponade a hemorrhage is not free of risks. Complications are around the corner and can be due either to mechanical compression or to phlogistic effects secondary to the material used. This paper reviews about 20 animal and clinical published studies with regard to the chemical properties, mechanisms of action, use and complications of local agents.

[12. Int J Periodontics Restorative Dent](#), 2003;23:313-23

**Bone healing and soft tissue contour changes following single-tooth extraction: a clinical and radiographic 12-month prospective study.**

[Schropp L, Wenzel A, Kostopoulos L, Karring T.](#)

**Summary:**

Preservation of alveolar bone volume following tooth extraction facilitates subsequent placement of dental implants and leads to an improved esthetic and functional prosthodontic result. The aim of the present study was to assess bone formation in the alveolus and the contour changes of the alveolar process following tooth extraction. The tissue changes after removal of a premolar or molar in 46 patients were evaluated in a 12-month period by means of measurements on study casts, linear radiographic analyses, and subtraction radiography. The results demonstrated that major changes of an extraction site occurred during 1 year after tooth extraction.

[13. Clin Oral Implants Res](#), 2003;14:263-8

**Enzymatic degradation of collagen-guided tissue regeneration membranes by periodontal bacteria.**

[Sela MN, Kohavi D, Krausz E, Steinberg D, Rosen G.](#)

**Summary:**

Bacterial infection in the vicinity of guided tissue regeneration barrier membranes was shown to have a negative effect on the clinical outcomes of this increasingly used technique. Several oral and specifically periodontal bacteria were shown to adhere to such membranes in vivo and in vitro with a higher affinity to membranes constructed from collagen. The present study examined the role of periodontal bacteria and their enzymes in the degradation of commercially used collagen membranes. Degradation of two collagen membranes [Biomend (Calcitek, Colla-Tec Inc, Plainsboro, NJ) and Bio-Gide (Geistlich Biomaterials, Wolhusen, Switzerland)] labeled by fluorescein isothiocyanate was examined by measuring soluble fluorescence. *Porphyromonas gingivalis*, *Treponema denticola* and *Actinobacillus actinomycetemcomitans* and their enzymes were evaluated. Collagenase from *Clostridium histolyticum* was used as a positive control. While whole cells of *P. gingivalis* were able to degrade both types of membranes, *T. denticola* could degrade Bio-Gide membranes only and *A. actinomycetemcomitans* whole cells could degrade none of the membranes. Fractionation of *P. gingivalis* cells revealed that cell membrane associated proteases were responsible for the degradation of the two collagen membranes. In *T. denticola*, the purified major phenylalanine protease was found to be responsible for the degradation of Bio-Gide membranes. These results suggest that proteolytic bacterial enzymes may take part in the degradation of collagen barrier membranes used for guided tissue regeneration.

[14. Cells Tissues Organs](#), 2000;167:33-7

**Early bone healing events following rat molar tooth extraction.**

[Devlin H.](#)

**Summary:**

Healing of the rat tooth extraction socket occurs rapidly, indicating a mechanism for cancellous bone formation occurring swiftly throughout the matrix. The residual periodontal ligament is evident at 2 days after extraction and its rich collagen type III fibre content may form a template for future cancellous bone formation. In the remainder of the early tooth extraction socket, fibronectin staining was generalized. The widespread distribution of fibronectin staining has given rise to speculation that the function of fibronectin may be important in granulation tissue formation, by providing a template matrix for fibroblast migration. Osteoprogenitor cells migrated into the socket from the surrounding bone, and produced decorin and proMMP-13 (procollagenase-3). ProMMP-13 was only expressed at sites of new bone formation, e.g. the border of the recently formed trabecular islands or the periphery of the closing socket. Collagen type I fibres were formed later, and were especially evident at 6 days after extraction. The pattern of distribution of both collagen type I and III fibres were similar as they passed from the bone margin towards the centre of the socket – in the same direction as the forming bone trabeculae. Bone formation occurs by rapid movement of the osteoprogenitor cells along these collagen fibres to allow a rapid healing, rather than that of resorption followed by slow bone deposition.

[15. J Am Acad Dermatol](#), 1996;34:434-8

**Histologic and immunohistochemical features in biopsy sites in which bovine collagen matrix was used for hemostasis.**

[Smith KJ, Skelton HG, Barrett TL, Welch M, Beard J.](#)

**Summary:**

**BACKGROUND:**

Bovine collagen matrix (Helistat and Helatene), which is used primarily for hemostasis, decreases wound contracture in skin biopsy sites and promotes wound granulation.

**OBJECTIVE:**

Our purpose was to evaluate excision specimens of previous biopsy sites to determine whether there are histologic differences between cases in which bovine collagen matrix was used for hemostasis and those in which it was not used.

**METHODS:**

Thirty-two diagnostic punch biopsies were done with hemostasis obtained with bovine collagen matrix in 24 biopsies and by pressure alone in eight. The biopsy sites were reexcised at various time intervals, and the histologic and immunohistochemical features were evaluated and compared.

**RESULTS:**

In specimens in which collagen matrix was used, migration of stromal and epithelial cells along the bovine collagen matrix was evident by 2 days and had progressed rapidly by 4 days. Around and within the matrix hyaluronic acid increased during the first 8 to 10 days. Initially stromal cells stained with CD34 and reticulum fibers were present at 8 to 10 days. At 12 to 15 days, factor XIIIa+ stromal cells were present within the matrix, and host collagen fibers were present and well-oriented within the degenerating matrix. Biopsy specimens allowed to heal without the matrix showed a delayed and an uneven increase in hyaluronic acid. Furthermore, the granulation tissue within the dermis showed no organization with a persistent acute inflammatory infiltrate and increased muscle actin-positive stromal cells as scar formation proceeded.

**CONCLUSION:**

Bovine collagen products appear to provide a matrix that promotes thrombosis. The collagen matrix also promotes migration and attachment of stromal and epithelial cells, thereby organizing and accelerating wound healing.

[16. Clin Pharm](#), 1992;11:857-64

**Oral anticoagulant therapy in patients undergoing dental surgery.**

[Weibert RT.](#)

[17. Dtsch Zahnärztl Z](#), 1990;45:400-2

**Zur Beurteilung der hamostyptischen Eigenschaft eines Kollagenpräparates.  
[Evaluation of the hemostyptic properties of a collagen preparation]**

[Dehen M, Niederdellmann H, Lachner J.](#)

**Summary:**

In vitro tests were carried out to determine whether the haemostyptic properties of a collagen monomer were lost during the manufacturing process. An increased recalcification time and thromboplastin time as well as failure of the thrombocytes to adhere to the collagen fibres were observed. This indicates that blood coagulation can be attributed only to mechanical irritation of the blood corpuscles and not to the properties of the collagen molecules.

[18. J Endod](#), 1989;15:310-4

**Effects of two hemostatic agents on osseous healing.**

[Haasch GC, Gerstein H, Austin BP.](#)

**Summary:**

The effects of Adaptic and Avitene on bone healing were evaluated histologically. The studied materials were placed in osseous defects created in rat tibias with a #8 round bur in a slow-speed handpiece. The materials were left in situ for experimental periods of 7, 14, 28, 60, 90, and 120 days. Histological evaluation of specimens from each of these periods demonstrated that Avitene was resorbed and did not impede bone healing. Adaptic was not resorbed at the end of the longest experimental period, 120 days. This material caused a foreign body reaction characterized by encapsulation of the Adaptic by fibrous connective tissues. Both Adaptic and Avitene were satisfactory hemostatic agents. The results of this study suggest that Adaptic should be used only in those situations where complete retrieval of the material from surgical sites can be assured.

[19. Int Surg](#), 1988;73:42-3

**The use of absorbable microfibrillation collagen to control sternal bone marrow bleeding.**

[Blanche C, Chaux A.](#)

**Summary:**

Because of the fact that bone wax plays a significant role in delayed healing of the sternum an alternative technique for the control of sternal bone marrow bleeding has been devised. It consists of the application of fashioned strips of absorbable microfibrillar collagen to the cut surface of the sternal marrow after the sternum is divided and/or prior to its closure. This initial clinical experience has been excellent.

[20. J Bone Joint Surg Am](#), 1978;60:454-6

**Topical hemostatic agents for bone bleeding in humans. A quantitative comparison of gelatin paste, gelatin sponge plus bovine thrombin, and microfibrillar collagen.**

[Harris WH, Crothers OD, Moyen BJ, Bourne RB.](#)

**Summary:**

The three topical hemostatic agents--gelatin paste, microfibrillar collagen, and gelatin sponge soaked in thrombin--individually were effective in reducing bleeding from cancellous bone, as tested on the femoral surface of trochanteric osteotomies during total hip replacement. During a three-minute interval, the spontaneous reduction in bleeding in eight control hips to which no agent was applied was 11 per cent. Gelatin paste gave a reduction of 85 per cent; gelatin sponge soaked in thrombin, a reduction of 75 per cent; and microfibrillar collagen, a reduction of 47 per cent. None of these agents interfered with healing of the trochanteric osteotomy.

[21. Alpha Omegan](#), 1967;60:126-9

**Healing of the socket following tooth extraction.**

[Pietrovski J.](#)

