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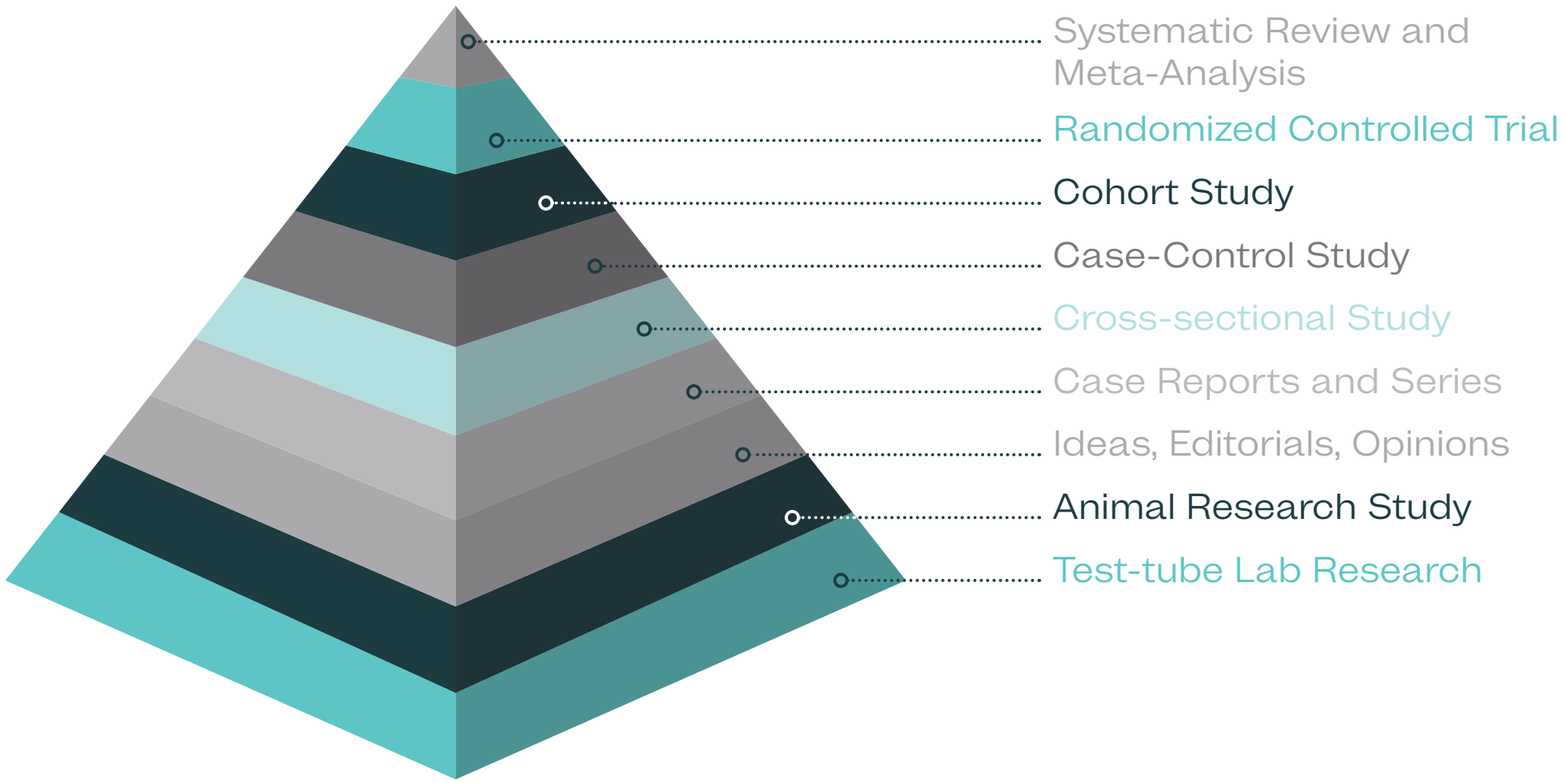
Bibliography

Overview of publications

Study Types



Systematic Review
A summary and critical assessment of published studies that address a particular clinical issue. An organized method of locating, assembling, and evaluating literature on a particular topic including a set of specific criteria. A systematic review is typically structured in a description of the findings in the research studies and may also include a quantitative pooling and evaluation of the data, a so called meta-analysis.

Meta-Analysis
A meta-analysis is a statistical analysis that combines and compares the results from different studies to the same issue.

Randomized Controlled Trial
A controlled clinical trial where patients are allocated randomly (by chance) to two or more groups (i.e. treatment vs. placebo or new treatment vs. standard treatment). This set up aims at reducing bias and a quantitative evaluation of treatment outcomes.

Cohort Study (Prospective Observational Study)
An observational clinical research study in which people who share a common characteristic like a certain condition or receive a particular treatment are followed over time and compared with a control group that does not share the characteristic or is not affected by the condition. Thereby, connections between the characteristic and outcome or disease can be analyzed.

Case-control Study
Observational study where researchers choose people with a particular outcome (the cases) and check their records to analyze causal attributes (i.e. risk factors). They evaluate the potential relationships of certain causal attributes with the outcomes.

Cross-sectional Study
Empirical analysis and comparison of a defined population at a single point in time or a time interval with simultaneous determination of exposure and outcome.

Case Reports and Series
An observational report on a series of patients with an outcome of interest without control group.

Ideas, Editorials, Opinions
Authored by experts regarding a specific clinical field or topic.

Animal Research Study
Study set ups using animal subjects. Often used to test a certain treatment before using it in clinical studies with human patients.

Test-tube Lab Research
In vitro experiments that are conducted in a controlled laboratory setting.

Animal Studies

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes/Summary
Lamme E. N.	1998	The Journal of Investigative Dermatology	Living skin substitutes: Survival and functions of fibroblasts seeded in a dermal substitute in experimental wounds	animal study 3D cell culture	3 pigs	Collagen-elastin matrix + STSG	STSG alone		In the wounds treated with the seeded dermal substitute, fluorescent PKH-26-labeled cells were detectable up to 6d and were positive for vimentin but not for a macrophage antibody. After 5d, flow cytofluorometry showed the presence of 3.1 (+/-0.9) x 10(6) (mean +/- SD, n=7) PKH-26-positive cells in these wounds, whereas initially only 1 x 10(6) fluorescent fibroblasts had been seeded. In total, the percentage of mesenchymal cells minus the macrophages was similar after 5d between wounds treated with the seeded and the acellular substitutes. In the wounds treated with the seeded substitute, 19.5% of the mesenchymal cells were of seeded origin. Furthermore, the rate of substitute degradation in the seeded wounds was significantly lower at 2-4 wk after wounding than in wounds treated with the acellular substitute. Vascular in-growth and the number of infiltrated macrophages were not different. In conclusion, cultured dermal fibroblasts seeded in an artificial dermal substitute and transplanted onto full-thickness wounds in pigs survived and proliferated.
Geyer S. H.	2014	Annals of Anatomy	High resolution episcopic microscopy (HREM): A useful technique for research in wound care	animal study 3D cell culture	2 pigs	MatriDerm® + STSG	native MatriDerm®, MatriDerm® populated with keratinocytes	one-step	This article discusses the use of high-resolution episcopic microscopy (HREM) for evaluating MatriDerm® ex- and in vivo. HREM was able to visualize the exact fiber architecture of MatriDerm® and the distribution of keratinocytes in matrices populated with keratinocytes. In addition, HREM was used to visualize the appearance and revascularization of MatriDerm® after its implantation beneath split skin grafts. The results suggest that HREM can be a useful tool for optimizing surgical procedures and post-implantation wound treatment regimes using MatriDerm®.
Wietbrock J. O.	2016	Tierärztliche Fakultät der Ludwigs-Maximilians-Universität München	Funktioneller Gewebeersatz bei komplexen Hautweichteildefekten mit einer hämodynamisch stimulierten und in vivo axial vaskularisierten Bindegewebslappenplastik	thesis/animal testing	30 rats (analyzed 21)	MatriDerm®	Integra®		This study aimed to determine the optimal matrix and prefabrication duration for a free connective tissue flap based on an arteriovenous (AV) loop, which is a viable vascular network that allows for sufficient oxygen supply and in vivo Integration of artificial tissue. The study found that MatriDerm® resulted in higher vessel formation and cell migration than Integra® DRT, and that the use of a stiff, elastic matrix correlated with increased in vivo vascularization and cell migration. Increased vascularization, increased cell migration into the matrix, degradation of MatriDerm® after 4 weeks, higher vessel density, increased strong-elasticity (linear progression for expansion untill 30%, n=2), higher tear strength, cells were found in the centrum and periphery of the matrix, complete restoration of the original length after expansion of the matrix (compared with Integra®), less thrombosis.
De Vries H.	1994	Wound Repair Regen	Dermal regeneration in native non cross linked collagen sponges with different extracellular matrix molecules	animal study (porcine model)		reconstituted and native collagen matrices + STSG	collagen matrix coated with alpha-elastin; coated with fibronectin, coated with hyaluronic acid	one-step	No inflammatory responses were observed. Reconstituted matrices degraded within 1 week, native matrices lasted 2 weeks, native matrices with additions remained intact for up to 4 weeks. Larger amounts of newly formed matrix components in native matrices with coatings. Best aesthetic results were obtained with native collagen coated with elastin. Fibronectin-treated matrices caused aberrant epithelization. When hyaluronic acid was added, matrices were invaded by more fibroblasts and myofibroblasts. This process correlated with fibrosis and wound contraction. In contrast, the native collagen/elastin matrix reduced the amount of fibroblasts #and myofibroblasts. Collagen-elastin matrix resulted in optimal dermal regeneration, the formation of a neodermis with random organized collagen bundles and little wound contraction by dimished myofibroblast expression.
Schneider J.	2009	Burns	MatriDerm® versus Integra®: a comparative experimental study	animal – comparative study (rats)		MatriDerm®	Integra®	2-step	MatriDerm® and the dermal part of Integra® were compared in a two-step procedure including matrix implantation and subsequent epidermal grafting. Neonatal rat epidermis was used as coverage to test for rapid and complete take. No difference in efficiency and quality of vascularization expressed by take rate of epidermis, and thickness of resulting neodermis.
Böttcher-Haberzeth S.	2011	Pediatr Surg Int	MatriDerm® 1mm versus Integra® Single Layer 1.3mm for one-step closure of full thickness skin defects: a comparative experimental study in rats	animal – controlled study	15 rats	MatriDerm®	Integra® single layer and neonatal rat epidermis only	one-step	In the MatriDerm® group, neodermal mean thickness of 0.49mm (SD 0.03mm). Integra® Single Layer group mean thickness of 0.67mm (SD 0.015mm). Both approximating the physiological dermal–epidermal ratio. In the control group, a mean thickness of 0.27mm (SD 0.036mm). Cell density was higher than the Integra®-based neodermis. There were no difference in other parameters.
Philandrianos C.	2012	Burns	Comparison of five dermal substitutes in full-thickness skin wound healing in a porcine model	animal – randomized controlled study	10 pigs	MatriDerm® (2mm)	Integra(®), ProDerm(®), Renoskin(®), and Hyalomatrix(®)	2-step (Grafted after 21 days)	No difference in wound contraction and in Vancouver scale after 2 and 6 months of healing. Integration of Integra® was significantly less than Integration of Hyalomatrix 1 (p=0.022) and MatriDerm® 1 (p=0.020). In all cases, the epidermis and dermis was reconstructed with a papillary basal membrane. Limitations of study: STSG was placed 21 days after placement of MatriDerm®. Optimal grafting time for MatriDerm® is 7-12 days post-op. 21 day grafting as shown in this study is not optimal for MatriDerm®.
Killat J.	2013	Int. J. Mol. Sci.	Cultivation of keratinocytes and fibroblasts in a three-dimensional bovine collagen-elastin matrix (MatriDerm®) and application for full thickness wound coverage in vivo	animal study 3D cell culture		MatriDerm® seeded with keratinocytes and fibroblasts		n.ap	Long-term cell survival, migration and proliferation of keratinocytes and fibroblasts. Full matrix Integration and wound healing and stable epithelialization at 3 weeks. Seeded MatriDerm® sheets showed full Integration in the wound model. Excellent Integration concerning epithelial regeneration and stratification. No significant difference between the skin substitute and normal skin in the animal.

Animal Studies

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Michael S.	2013	PLOS	Tissue Engineered Skin Substitutes Created by Laser-Assisted Bioprinting Form Skin-Like Structures in the Dorsal Skin Fold Chamber in Mice	animal / in vitro Bioprinting		MatriDerm®			Via the use of LaBP, a multi-layered, fully cellularized skin equivalent was created. MatriDerm® becomes populated by the printed fibroblasts. Blood vessels started growing into MatriDerm® from the wound bed and the wound edge mostly in the direction of the transplanted cells. The printed keratinocytes formed a multi-layered epidermis with beginning differentiation and stratum corneum. The transplanted MatriDerm® skin construct Integrated well into the surrounding tissue and no harmful effects occurred.
Wiedner M.	2014	Wound Repair Regen	Simultaneous dermal matrix and autologous split-thickness skin graft transplantation in a porcine wound model: a three-dimensional histological analysis of revascularization	animal study		MatriDerm® + STSG	STSG alone	one-step	The study analyzed the revascularization process involved in the simultaneous application of dermal matrices and split-thickness skin grafts using high-resolution episcopic microscopy in a porcine excisional wound model. The presence of the dermal matrix did not decelerate the revascularization process, and the revascularization process was comparable in both groups. The thickness of the dermal layer increased in both groups, revealing a statistically significant higher thickness of the dermal matrix group vs. control on day 5 and day 28. New vessels in the matrix are visible at day 10. MatriDerm® not visible anymore after 15 days.
Lee	2016	Materials Science and Engineering C	Three dimensional poly (ε-caprolactone) and silk fibroin nanocomposite fibrous matrix for artificial dermis	in vitro / animals study		poly (ε-caprolactone) and silk fibroin nanocomposite fibrous matrix	MatriDerm® (in vivo model, histology)		The study reports a novel strategy to „engineer" a controlled 3D nanocomposite fibrous matrix of poly (ε-caprolactone) (PCL) and silk fibroin (SF) for an artificial dermis application. MatriDerm® showed faster healing than the other scaffold, after 15 days of implantation wound size decreased noticeably. All specimens showed at 5 days post-implantation a foreign body reaction, 10 days post-implantation: new blood vessels formed. Better binding of MatriDerm® to host tissue but no complete filling of dermal defects.
Leibig	2016	Plast. Reconstr. Surg.	Flow-Induced Axial Vascularization: The Arteriovenous Loop in Angiogenesis and	animal study			MatriDerm® (4 mm) (2 layer 2 mm)		Arteriovenous loop with MatriDerm®-filled isolation chamber showed a connective tissue nourished by the newly formed vascular network 4 weeks after AV loop placing.
Petersen	2016	Burns	The use of collagen-based matrices in the treatment of full-thickness wounds	animal Study	collagen-gelatin: n = 36, MatriDerm® (1mm) n = 6, untreated wounds = 6	Collagen-gelatin fleece (newly applied every second day), MatriDerm® one application	no treatment	no STSG, Wounds were covered by occlusive foil and Fixomull tape	The article examines the effect of a novel collagen-gelatin fleece in comparison to untreated controls and MatriDerm® in the healing of deep dermal wounds. The study found that all tissue-engineered products, including the single application of MatriDerm® and any concentration of the collagen-gelatin fleece, accelerated dermal wound healing compared to untreated wounds. The best outcomes were achieved in wounds covered with 150 g / m² collagen-gelatin fleece, especially when applied multiple times, as well as in wounds covered once with MatriDerm®, with an average benefit of 2.83 days. Skin quality also improved in both template groups compared to untreated controls. Wound closure with MatriDerm®: 10,67 days, with collagen-gelatin 11 days. Epidermal thickness after 21 days: MatriDerm®: 31, collagen-gelatin single application: 27,74, multiple application 30,8, Epidermal cell count MatriDerm®: 84,5 cells, collagen-gelatin: 52 / 54 cells. Only MatriDerm® wounds showed epithelial extensions.
Tuca	2016	Placenta	Comparison of Matrigel and MatriDerm® as a carrier for human amnion-derived mesenchymal stem cells in wound healing	animal study / technical note	18 rats	1) MatriDerm® + AMSC (n = 4) 2) MatriDerm® (n = 5) vs MatriDerm® + AMSC (nv = 5)	1) Matrigel + AMSC (n = 4)		The use of MatriDerm® in combination with amnion-derived mesenchymal stem cells (AMSC) has shown promising outcomes in promoting neovascularization of the wound area and enhancing wound closure and capillary formation compared to MatriDerm®-only treated wounds. While Matrigel proved to be an excellent matrix for AMSC and immigrating mouse cells, the solid MatriDerm® enabled a more adequate positioning of AMSC into the wound. Although AMSC did not attach to MatriDerm®, they reliably induced wound reduction.
Schmidt	2017 a	Journal of Tissue Engineering and Regenerative Madicine	Hemodynamically stimulated and in vivo generated axially vascularized soft tissue free flaps for closure of complex defects: Evaluation in a small animal model	animal study / prospektiv	35 female Sprague Dawley rats	group 2: AV loop flap produced by the use of MatriDerm® (2 mm) + split thickness skin graft	group3: MatriDerm®(2 mm) + split thickness skin graft group 1: split thickness skin graft	one-step	The article reports on a study that evaluated the use of AV-loop-generated flaps for the reconstruction of critical bone-exposing defects using a rat model. The study found that the AV-loop-generated flaps resulted in stable wound coverage with homogeneous vascular Integration compared to the control groups. Neoangiogenesis was evident in all constructs, and significant increases in mean vessel number and mean vessel area were observed over time. Cell migration and proliferation into the matrix were also observed, with a significant increase over time. The AV-loop-generated flaps resulted in sufficient defect reconstruction and stable tissue coverage compared to the control groups. MatriDerm® efficiently promotes neovascularization and is suitable for tissue engineering of vascularized soft tissue flaps.
Schmidt	2017 b	Ann Plast Surg	Collagen-Elastin and Collagen-Glycasamino-glycan Scaffolds Promote Distinct Patterns of Matrix Maturation and Axial Vascularization in Arteriovenous Loop-Based Soft Tissue Flaps	animal study	19 female Sprague Dawley rats	MatriDerm®	Integra®		The study evaluated different collagen-based scaffolds for soft tissue engineering using an arteriovenous (AV) loop model in rats. Both MatriDerm® and Integra® howed increased vessel count and area at day 28 compared to day 14, but MatriDerm® had a higher vessel count and more homogeneous vascular network. MatriDerm® showed better vascularization compared to Integra® and higher cell migration for MatriDerm®.
Ertl	2018	Placenta	Comparative study of regenerative effects of mesenchymal stem cells derived from placental amnion, chorion and umbilical cord on dermal wounds	in vitro / animals study	mice (n = 5 per group)	MatriDerm® as carrier for mesenchymal stem cells	MatriDerm® alone		Three types of PMSCs (AMSCs, BV-MSCs, and WJ-MSCs) were evaluated for their effects on wound healing in mice using MatriDerm® as a carrier. All PMSC types significantly induced faster healing and a higher number of blood vessels in the wound compared to controls. Co-application with placental endothelial cells did not further improve the advantageous effects of PMSC treatment. Results indicate that all three PMSC types exert similar beneficial effects on wound closure and neovascularization in the mouse model. Using MatriDerm® as a carrier for PMSCs allows for a fast and clinically practicable method for stem cell application.

Animal Studies

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes/Summary
Gasanz	2018	Cent European J Urol	Use of an acellular collagen-elastin matrix to support bladder regeneration in a porcine model of peritoneo cystoplasty	animal Study	n=11/n=5	peritoneum graft + MatriDerm® (1mm)	Peritoneum graft	one-step	In a study using a porcine model, the benefits of using an acellular collagen-elastin matrix in bladder augmentation were examined. After 6 weeks, the group with the matrix showed less retraction and better histological results (including neo-angio-genesis and less fibrosis) compared to the group without the matrix. However, no differences were observed in functional test results and the study concluded that while the use of the matrix was beneficial, further improvements are needed to consider it an appropriate cystoplasty technique.
Hatzfeld	2019	IWJ	Benefits of cryoerserverd human amnotic mambranes in association with conventional treatments in the manaement of full-thickness burns	animal study + clinical cas Report		MatriDerm® + STSG and MatriDerm® + STSG + HAM	STSA alone and STSA plus human amniotic membrane (HAM)	one-step	The addition of cryopreserved amniotic membranes (HAM) to split-thickness skin autografts (STSA) or STSA with the dermal substitute MatriDerm® reduced scar contraction and increased scar elasticity in an experimental model for deep burns. The presence of HAM increased dermal neovascularization and fibroblast recruitment to the wound site, but had no effect on the recruitment of inflammatory cells. In a clinical case study, the use of HAM with MatriDerm® reduced dorsal retraction and allowed for good elasticity on the dorsal skin of the hand, while the palmar region without HAM had high rigidity with strong retraction.
Gonzalez-Quevedo	2020	THE BONE & JOINT JOURNAL	Improving the regenerative microenvironment during tendon healing by using nanostructured fibrin/agarose-based hydrogels in a rate Achilles tendon injury model	animal		MatriDerm®	nanostructured fibrinagarose hydrogel (NFAH) or genipin cross-linked nanostructured fibrinagarose hydrogel (GP-NFAH)		The study investigated the effect of MatriDerm®, NFAH and GP-NFAH on Achilles tendon healing in rats. The results showed that NFAH and GP-NFAH had significantly higher tensile strength compared to MatriDerm®. In vivo evaluation of repaired tendons using NFAH, GP-NFAH and MatriDerm® resulted in better organization of collagen fibers and cell alignment than direct repair, with a better histological score in GP-NFAH.
Maitz	2020	J Tissue Eng Regen Med.	The effects of cross-linking a collagen-elastin dermal template on scaffold bio-stability and degradation	in vitro/ animals study		MatriDerm®	MatriDerm® cross-linked		Cross-linking MatriDerm® resulted in a threefold increase in tensile strength, significantly less protein loss, and reduced scaffold contraction in vitro. Furthermore, non-cross-linked MatriDerm® was almost completely biodegraded after 14 days in a mouse model, whereas cross-linked MatriDerm® remained intact with a similar host response. The extended structural integrity of cross-linked MatriDerm® could potentially facilitate improved skin tissue regeneration and promote the formation of a more pliable scar.
Eisler	2022	Applied Sciences	Assessment of two commonly used dermal regeneration templates in a swine model without skin grafting	animal study	18 full thickness wounds pig	MatriDerm® (1mm) without STSG	Integra® without STSG and control without dermal template	n.ap	The study compared the effectiveness of two dermal substitutes – MatriDerm® and Integra® – on full-thickness skin defects without a STSG. The results showed that both MatriDerm® and Integra® treatment groups demonstrated significantly faster wound closure than the control group, with MatriDerm® at 10.67 +/- 0.94 days and Integra® at 10.00 days +/- 1.15 days. The histologic examination revealed that MatriDerm® had lower epidermal thickness than Integra®, but a higher cell density. Rete ridge formation was visible for both MatriDerm® and Integra® treatment groups. Overall, the study showed that MatriDerm® and had an improved wound healing and resulted in faster re-epithelialization compared to the control group when used without STSG.

In-vitro studies

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes/Summary
Welling O.	2008	Medizinische Fakultät der Albert-Ludwigs-Universität Freiburg im Breisgau	Hautersatz durch Kultivierung von humanen Keratinozyten und Fibroblasten in einer Kollagen-Elastin Matrix in vitro und in vivo im Nacktmausmodell	in vitro/in vivo (thesis) 3D cell culture	48 mice			one-step	Matriderm® is very stable under cell culture conditions (no changes in structure and stability), good population on Matriderm® with keratinocytes and fibroblasts, full-thickness skin substitution: better wound healing with Matriderm® compared to full-thickness wound without substitution (faster wound closure and epithelization, no purulence), best results for groups for Matriderm® populated with cells: wound closure at day 7, decreased contracture, mature epithelium for Matriderm® populated with cells at day 14, closed multilayered epithelium at day 28, high migration into the matrix, vascularization visible at day 14, basement membrane at day 14, fibroblasts only in close proximity to keratinocytes (at day 28 increased detection under basement membrane).
Golinski	2011	Journal of Periodontal Research	Oral mucosa model based on a collagen–elastin matrix	in vitro		MatriDerm®			Histological, immunohistochemical and electron microscopic analysis of the dermal/epidermal junction showed a typical basement membrane and hemidesmosomal structures. Neighboring keratinocytes formed desmosomes in the epidermal sections. Cytokeratin was detectable in all epidermal layers. These experiments revealed that the collagen-elastin matrix was highly biocompatible with gingival cells under ex vivo conditions.

In-vitro studies

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Zöller N.	2014	Dermatology	Clinical application of a tissue-cultured skin autograft: An alternative for the treatment of non-healing or slowly healing wounds?	in vitro / clinical	1 case	MatriDerm® + tissue-cultured skin autograft			The study suggests that tissue-cultured skin autografts may be an alternative treatment for full-thickness wounds and wounds that cover large areas of the body surface. Autologous epidermal and dermal cells were isolated, expanded in vitro and seeded on MatriDerm® scaffolds, resulting in a skin equivalent that was transplanted onto a facial chronic ulceration of a 71-year-old patient. The skin structure at the transplantation site closely correlated with the adjacent undisturbed skin after 138 days, indicating the potential for clinical applications.
Golinski	2009	Handchir Microchir Plast Chir	Development of an engraftable skin equivalent based on MatriDerm® with human keratinocytes and fibroblasts	in vitro		MatriDerm®			Histological analysis showed a regularly stratification of the epidermal part. Observed collagen IV, a marker for the basement membrane, between epidermis and dermis. Desmoglein and the differentiation markers involucrine and cytokeratin 10 were found in the suprabasal layers of the epidermis. Electron microscopic analysis showed the basement membrane in the epidermal junction zone as well as cell-cell connections in the form of desmosomes. Late differentiation characteristics, like granular structures and the cornified layer, were found in the stratum granulosum and stratum corneum. Results demonstrate that a skin equivalent can be generated by using a collagen/elastin matrix, with an expansion rate of 50-100-fold.
Lee	2016	Materials Science and Engineering C	Three dimensional poly (ε-caprolactone) and silk fibroin nanocomposite fibrous matrix for artificial dermis	in vitro / animals study		poly (ε-caprolactone) and silk fibroin nanocomposite fibrous matrix	MatriDerm®		The study reports a novel strategy to „engineer" a controlled 3D nanocomposite fibrous matrix of poly (ε-caprolactone) (PCL) and silk fibroin (SF) for an artificial dermis application. MatriDerm® showed faster healing than other scaffold, after 15 days of implantation wound size decreased noticeably. All specimens showed at 5 days post-implantation a foreign body reaction, 10 days post-implantation: new blood vessels formed. Better binding of MatriDerm® to host tissue but no complete filling of dermal defects.
Alharbi	2023	Med Sci (Basel)	The LipoDerm Method for Regeneration and Reconstruction in Plastic Surgery: A Technical Experimental Ex Vivo Note	experimental ex vivo					In an ex vivo experimental note, nanofat-containing ASCs were seeded onto Matriderm® for cellular enrichment and found to be viable and attached to the top layer of the scaffold within 1 hour of incubation. The proposed multi-layered structure containing nanofat and dermal template (Lipoderm) could potentially be used as a biological regenerative graft for wound defect reconstruction and regeneration in a single operation, leading to more optimal regeneration and aesthetic outcomes.
Mulder	2023	J Funct Biomater	Full Skin Equivalent Models for Simulation of Burn Wound Healing, Exploring Skin Regeneration and Cytokine Response	ex Vivo	n.ap	MatriDerm®	Mucomaix	n.ap	In an in vitro study on skin regeneration, MatriDerm®-based full skin equivalents (FSEs) showed proper dermal and epidermal morphogenesis, comparable to ex vivo human skin models, with a well-developed dermis and pan-cytokeratin-positive epidermis, including a basement membrane, stratum spinosum, and stratum corneum. After a standardized burn injury, re-epithelization occurred in the MatriDerm®-based FSEs at 2 weeks, similar to ex vivo human skin. MatriDerm®-based FSEs showed regenerative capacity with a neo-epidermis that contained proliferating cells, whereas FSEs based on Mucomaix were not observed to regenerate the burned epidermis. The level of pro-inflammatory cytokines was high in all FSE models, including MCP-1, IL-4, IL-6, and IL-8, with a modest increase observed only in MatriDerm®-based FSEs in response to burn injury. MatriDerm®-based FSEs can serve as a preclinical animal-free in vitro model to facilitate research on skin.
Monsuur	2018	J Cell Physiol	Endothelial cells enhance adipose mesenchymal stromal cell-mediated matrix contraction via ALK receptors and reduced follistatin: Potential role of endothelial cells in skin fibrosis	in vitro		MatriDerm® for the generation of in vitro fibrosis model			MatriDerm® was used to develop an in vitro fibrosis model to study the interaction between endothelial cells (EC) and dermal fibroblasts or adipose tissue-derived mesenchymal stromal cells (ASC). This in vitro study found that endothelial cells (EC) could stimulate adipose tissue-derived mesenchymal stromal cells (ASC)-mediated matrix contraction, leading to a fibrotic phenotype, similar to hypertrophic scars, via regulation of fibrosis-related proteins. The TGF-β pathway played a role in this process, and inhibiting the ALK4/5/7 receptors or adding recombinant follistatin decreased matrix contraction.
Dill	2020	IWJ	Biological dermal templates with native collagen scaffolds provide guiding ridges for invading cells and may promote structured dermal wound healing	in vitro		MatriDerm®	Integra® Pelnac		The study investigated the ultrastructural features and properties of different biological dermal templates, specifically focusing on the impact of collagen nativity. Matriderm® demonstrated enhanced cell adherence, spreading, proliferation, and viability compared to Integra® and Pelnac, likely due to its intact collagen network. In contrast, biomaterials with lesser amounts of native collagen fibril networks showed a less pronounced potential to harbor these properties. The results suggest that biological dermal templates with higher content of native collagen networks, such as Matriderm®, may be beneficial for promoting accelerated wound healing and tissue regeneration.

Burns / contracture

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
van Zuijlen P. P. M	2001	Plastic and Reconstructive Surgery	Dermal substitution in acute burns and reconstructive surgery: A subjective and objective long-term follow-up	prospective, intra-individual	31	MatriDerm® + meshed split skin graft (wounds treated with silver sulfadiazine. Paraffin gauze and absorbent cotton soaked in a polyethylene / glycol / sorbitol povidone-iodine solution were applied on the top of the graft)	split skin graft (wounds treated with silver sulfadiazine. Paraffin gauze and absorbent cotton soaked in a polyethylene / glycol / sorbitol povidone-iodine solution were applied on the top of the graft)	one-step	Higher elasticity data reported for area with MatriDerm®, but without statistic significance. Measurements for burn wounds were comparable with control group. Most patients gave higher ratings for the substituted site. Effectiveness of dermal substitute seemed to have a relation with the expansion rate of the overlying mesh grafts. The substituted site seems smoother and more supple compared with the control sites when large expansion rates of the graft were applied. For these cases Cutometer measurements were higher, skin extension and pliability showed a statistically significant difference. Patients impression was higher for the substituted site.
Ryssel H.	2008	Burns	The use of MatriDerm® in early excision and simultaneous autologous skin grafting in burns--a pilot study	prospective controlled	10	MatriDerm® + STSG	split thickness skin graft	one-step	MatriDerm® significantly improved scar elasticity. Significant improvement of pliability (VBSS score) for sheet autografts. VBSS score MatriDerm® = 3, VBSS score STSG = 6 (p = 0.04)T ake rate: 83,4 % (p = 0.25). No difference in graft survival betwen MatriDerm® and STSG alone groups.
Dantzer E.	2009	Journal of Wound Technology	MatriDerm®: a new single-layer regeneration transcript	case series, retrospective analysis	15	MatriDerm®	none	one-step	In patients treated for loss of substance presenting vascular deficiencies of various degrees the MatriDerm® take was longer than using a split thickness skin graft alone. No failures were observed. Scars were pliable and elastic. In general, dermal substitute does not decrease complete healing-time but the quality of the final tissue applied to be better, especially over bone structure. Adherences is minimized compared to split skin grafts applied over the same anatomical area. Functional results are good. A return to a normal color was observed in one patient after a period of 8 months. No Scar retractions.
Lumenta D.	2009	J Burn Care Res	Adult burn patients with more than 60 % TBSA involved-Meek and other techniques to overcome restricted skin harvest availability--the Viennese Concept	comparative cohort	17	Meek, MatriDerm® as concomitant treatment	Non Meek, MatriDerm® as concomitant treatment		MatriDerm® served as a dermal template for coverage of areas of functional importance. Meek group vs non-Meek group had no difference in LoS, hopsital stay or number of operations. Meek technique is a treatment option in severe burn patients.
Ottomann C.	2009	Zeitschrift für Wundheilung	Die Kombination dermalen Ersatzes (MatriDerm®) und V.A.C. [article in German]	case series, retrospective analysis	105	MatriDerm®	none	one-step	93% uncomplicated success rate.
Bloemen M.	2010	Plast Reconstr Surg	Dermal substitution in acute burns and reconstructive surgery: a 12-year follow-up	prospective controlled	46	MatriDerm® + STSG	STSG alone	one-step	Even after 12 years an improved scar parameters was found in both acute and reconstructive substituted wounds. In the acute burn group, no differences were seen between substituted and reference scars. In the reconstructive scars, all elasticity parameters were higher in substituted scars. In the acute burn group, no statistically significant difference between substituted and reference scars was seen in surface roughness. However, the three roughness parameters were lower (better) in substituted scars. Subjective scar assessment (POSAS) in the acute burn group showed a statistically significant difference in favor of the substituted scars in all items, except for vascularization. In the reconstructive group, observer scores for pliability, relief, and the general score also showed significantly lower (better) results for substituted scars.
Bloemen M.	2012	Wound Repair Regen	Clinical effectiveness of dermal substitution in burns by topical negative pressure: a multicenter randomized controlled trial	randomized controlled trial	86	STSG + MatriDerm® with or without TNP	STSG without MatriDerm® and with or without TNP	one-step	No significant difference in graft take and epithelialization (ranging from 92.4 % to 96.1 %). Significantly fewer wounds in the TNP alone group showed postoperative contamination. Significant better elasticity in MatriDerm® + TNP group. At 12 months postoperatively, surface roughness scores were lower in scars treated with MatriDerm® (indicating a smoother surface), however without significant differences. Patient POSAS score at 12 months: MatriDerm® + STSG + TNP: 3.2; MatriDerm® + STSG: 3.7; TNP: 2.9; STSG alone: 3.4 Surgeon POSAS score: MatriDerm® + STSG+TNP: 2.7; MatriDerm® + STSG: 3.2; TNP: 2.6; STSG aline: 2.8.
Hop M.	2013	Burns	Cost study of dermal substitutes and topical negative pressure in the surgical treatment of burns	randomized controlled trial	86	STSG + MatriDerm® with or without TNP	STSG with or without MatriDerm® and with or without TNP	one-step	12 month post-op: highest elasticity was measured in scars treated with MatriDerm® and TNP (ratio Uf 0.80, p = 0.027). The initial cost price of treatment with MatriDerm® and TNP was € 2912 (p < 0.001). The mean length of hospital stay was respectively 21 days (including 1 ICU day), 24 days (3 ICU days), 22 day (2 ICU days), 21 days (1 ICU day) in the MatriDerm®-TNP, MatriDerm®, TNP, and STSG group. Mean total costs per patient did not differ significantly between groups (range € 29097 - € 43774).
Shin J. U	2014	International Journal of Dermatology	Extramarginal excision is preferable for hypertrophic scars	randomized controlled trial	15	7 children treated with AlloDerm® or MatriDerm® + STSG (2 patients intramarginal excision, 4 patients extramarginal excision. 1 patient both) (unspecified)	8 children treated with FTSG (4 patients intramarginal excision, 4 patients extramarginal excision)	not reported	Study evaluated the influence of surgical margins on the recurrence of hypertrophic scars and keloids and compared the recurrence rates between intramarginal excision and extramarginal excision. The study found that extramarginal excision with complete removal of the abnormal collagen bundles followed by skin grafting is a viable alternative to reconstruction of the foot after hypertrophic scar excision, and this treatment can effectively decrease issues related to recurrence. All grafts survived, no wound dehiscence. None of the patients received postoperative adjuvant therapy.
Bonnet A.	2015	Ann Chir Plast Esthet (Annales de chirugie plastique esthetique)	Operating room fire: should we mistrust alcoholic antiseptics	retrospective	4	MatriDerm® + skin graft (partially, 1 patient)	skin graft (3 patients)	one-step	34 yr old with 3rd degree burn on the thigh and hip. MatriDerm® + STSG placement with a second graft at day 39. Wounds fully healed at day 48.

Burns / contracture

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Demircan M.	2015	Burns	Preliminary results in single-step wound closure procedure of full-thickness facial burns in children using the collagen-elastin matrix and review of pediatric facial burns	case series	15	MatriDerm® + unmeshed split thickness skin	none	one-step	Improved cosmetic and functional skin quality compared to alternative techniques. All grafts transplanted to the face survived. Average VSS 2,55 +/- 1,42. Graft quality was close to normal skin in terms of vascularity, elasticity, pliability, texture and color. Esthetic and functional results have been encouraging.
van Zuijlen	2000	Plast Reconstr Surg	Graft survival and effectiveness of dermal substitution in burns and reconstructive surgery in a one-stage grafting model.	prospective intra-individual controlled study	62	MatriDerm® + STSG	STSG alone	one-step	MatriDerm® was applied in a one-step procedure with a split-thickness autograft, and compared to ta split-thickness autograft. The study showed that MatriDerm® did not alter autograft survival but significantly improved skin elasticity and pliability after reconstructive surgery. Burn group: 31 (84 wounds). Reconstr. Group: 31 (44 scars). Burns: 73.5% take rate (p = 0.015); no significant difference in elasticity parameters. Reconstr: 80.8% take rate (ns) and significant better pliability, elasticity, skin extension and retraction. It is feasible to use MatriDerm® in one-stage grafting, and it can provide benefits in improving skin elasticity and reducing scarring.
van Zuijlen	2002	Burns	Long-term results of a clinical trial on dermal substitution. A light microscopy and Fourier analysis based evaluation.	prospective intra-individual controlled study	57	MatriDerm® + STSG	STSG alone	one-step	This clinical trial compared conventional treatment to MatriDerm® in combination with an autograft for wound healing. Burn group: 29 biopsies. Reconstr. Group: 28 biopsies. No significant differences found for epidermal thickness, basement membrane maturation, rete ridge ratio, fibroblasts, myofibroblasts, inflammatory cells, vessels, ECM maturation. No difference in collagen orientation. Difference in collagen bundles observed.
Haslik W.	2007	Burns	First experiences with the collagen-elastin matrix MatriDerm® as a dermal substitute in severe burn injuries of the hand	case series	10	MatriDerm® + STSG		one-step	Take rate: 97%. No unstable scars or blisters observed. Full range of motion achieved. Overall VSS: 3.2 +- 1.2. Excellent pliability. Start of physical therpay within 14 days.
Atherton D.	2010	Plast Reconstr Surg	Early Excision and Application of MatriDerm® with simultaneous autologous skin grafting in facial burns	case report	1	MatriDerm® + STSG		one-step	MatriDerm® was used to resurface facial and neck defects after initial procedure with cadaveric skin. Better than expected outcome with respect to facial contour, texture and expression. Including case photo's.
Haslik W.	2010	J Plast Reconstr Aesthet Surg	Management of full-thickness skin defects in the hand and wrist region: first long-term experiences with the dermal matrix MatriDerm®.	case series	17	MatriDerm® + STSG		one-step	Take rate: 96%. No unstable scars or blisters observed. 12 month DASH score of 15.6 in patients with burn trauma and 27.2 in patients with a radial forearm flap. The overall score was 18.1, indicating that hand function was well re-established. 12 month Vancouver scar scale is 1.7.
Martínez-Méndez J.	2010	Cir. plást. iberolatinoam	Terapia de vacío como adyuvante para el uso de sustitutos dérmicos monocapa (Combined use of vacuum assisted device and dermal monolayer substitutes)	randomized controlled trial	20	MatriDerm® + VAC	MatriDerm® without VAC	one-step	No statistical difference in complication rate with a total complication rate of 20%. Significant difference in take rate time: was 21,4 ± 9 days in the MatriDerm® without VAC group and 13,9 ± 4 days in the MatriDerm® with VAC group. Skin graft uptake rate of 85%.
Ryssel H.	2010	Burns	Dermal substitution with MatriDerm® in burns on the dorsum of the hand	prospective controlled	18	MatriDerm® + STSG	STSG alone	one-step	The study found that the take-rate for wounds treated with Matriderm® 1 was 96.8% ± 8.73, while the control group had a take-rate of 94.6% ± 10.25. The difference between the two groups was not statistically significant (p > 0.05). The need for re-grafting was also not significantly different between the group treated with the dermal substitute and the conventionally treated group, with a rate of 5.6% in both groups. However, the VBSS demonstrated a significant improvement in the Matriderm® 1 group (median 2, minimum 1, maximum 5) compared to the control group (median 6, minimum 4, maximum 7) with a p-value of 0.02. The range of motion measured by Finger-Nail-Table-Distance was significantly better in the Matriderm® 1 group with a p-value of 0.04. On the other hand, Finger-Tip-Palmar-Crease-Distance values did not differ significantly between the two groups (p > 0.05).
Haik J.	2012	J Drugs Dermatol	Reconstruction of full-thickness defects with bovine-derived collagen/elastin matrix: a series of challenging cases and the first reported post-burn facial reconstruction	case series	7	MatriDerm® + STSG		one-step	Overall graft take was excellent without complications. Graft quality was close to normal skin in terms of elasticity, pliability, texture, and color. Good contour and cushioning of defects in weight bearing areas was also achieved.
Seo D.-K.	2014	ASTR	Management of neck contractures by single-stage dermal substitutes and skin grafting in extensive burn patients	retrospective case series	28	MatriDerm®	AlloDerm®	one-step	MatriDerm® or AlloDerm® was used as a dermal substitute in combination with split-thickness skin grafting to treat neck contracture in extensive burn patients. The overall take rate was 95.9%, and excellent/good outcomes were shown in 27 out of 28 patients. Complications occurred in 11 out of 28 patients, but no grafts failed to affect recontracture except in one patient with a partial loss of artificial dermis who underwent a follow-up skin graft without any problems. MatriDerm® Take rate 98.1% (p = 0.058) and VSS 1 yr: 2.23 (ns). AlloDerm® Take rate 93.9% and VSS 1 yr: 2.47. Functional and aesthetic outcomes were excellent in 18 patients and good in nine patients.
Delli Santi	2016	American Burn Association (Letter to the editor)	The Use of Dermal Regeneration Template (Matriderm® 1mm) for Reconstruction of a Large Full-Thickness Scalp and Calvaria Exposure	case	1	MatriDerm® (1mm)		one-step	MatriDerm® was used in a single procedure to reconstruct a large full-thickness scalp burn in a 43-year-old man, resulting from a suicide attempt. The prosthesis provided a better final aesthetic quality and simplicity of technique, allowing for a rapid solution and reducing recovery time. The use of Matriderm® also enables a higher quality of skin graft with less risk of infection, even in the case of patient non-collaboration. The product can be grafted immediately with autologous whole or meshed skin grafts, with an engraftment index equal to the autologous skin graft without the dermal prosthesis.

Burns / contracture

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Demircan	2017	J Turgut Ozal Med Cent	One-Step Reconstruction of Severe Burn Injury on the Face of A Child by Using the Collagen-Elastin-Matrix	case report	1	MatriDerm®		one-step	The use of Matriderm®, a collagen-elastin matrix, in severe post-burn facial reconstruction has resulted in 100% graft survival and early results show good quality graft with normal skin characteristics. Contour was achieved and no hypertrophic scarring occurred, leading to encouraging aesthetic and functional outcomes. Matriderm® can be a useful adjunct in facial reconstruction for quick healing.
Kamolz L.	2017	Handchir Mikrochir Plast Chir	Sekundäre Korrektur einer großflächigen Verbrennungsnarbe im Bereich des Handrückens mit einem Collagen-Elastin-Dermisersatz und Spalthaut	case study	1	MatriDerm®		one-step	20-year-old woman. 2 years post transplatation scar quality of the hands was good (VSS: 3 points) and an excellent hand functionality was achieved (DASH Score: 8,3). The case presented here shows that very good results can also be achieved at a later stage if consistent interdisciplinary follow-up care is followed after adequate chiropractic care.
Yagmur	2017	Turkish Journal of Plastic Surgery	Post-Burn Skin Deformities of the Face and Neck Region in Pediatric Patients: Single-Stage Treatment Using Collagen Elastin Matrix	case serie	8	MatriDerm®		one-step	The use of MatriDerm® in pediatric patients with burn deformities was evaluated in a study where eight patients were treated previously with non-surgical modalities without any significant benefits. The study showed that the use of MatriDerm® eliminated all contractures and significantly reduced the average surface area of defects postoperatively. The average contraction rate was 9.6%, and patient satisfaction was high. Additionally, there were no significant complications associated with graft take. The average VSS score at the 12th postoperative month (3.6 ± 0.91) was significantly ($p < 0.05$) lower than the preoperative score (10.25 ± 1.38), indicating a significant reduction in scarring. The average patient satisfaction rate was 1.9, indicating good satisfaction Furthermore, all complaints such as itching and unsightly scars were resolved postoperatively.
Hatzfeld	2019	IWJ	Benefits of cryoerserverd human amnotic mambranes in association with conventional treatments in the manaement of full-thickness burns	animal study + clinical cas report		MatriDerm® + STSG and MatriDerm® + STSG + HAM	STSA alone and STSA plus human amniotic membrane (HAM)	one-step	The addition of cryopreserved amniotic membranes (HAM) to split-thickness skin autografts (STSA) or STSA with the dermal substitute Matriderm® reduced scar contraction and increased scar elasticity in an experimental model for deep burns. The presence of HAM increased dermal neovascularization and fibroblast recruitment to the wound site, but had no effect on the recruitment of inflammatory cells. In a clinical case study, the use of HAM with Matriderm® reduced dorsal retraction and allowed for good elasticity on the dorsal skin of the hand, while the palmar region without HAM had high rigidity with strong retraction.
Jackson	2019	J Burn Care Res	Matriderm® and split-skin grafting for full-thickness paediatric facial burns	case report	n=1	MatriDerm® (1mm)		one-step	The use of MatriDerm® acellular dermal matrix with split-skin grafts in a 3-year-old girl with 60% full-thickness facial burns resulted in a 95% graft take on day 5 and great aesthetic outcomes in texture and color after 12 months. The technique also resulted in normal ocular and near-normal oral function, showing promise for both aesthetic outcome and functional skin movement in burn reconstruction.
Phillips	2020	Annals of burns and fire disasters	The use of dermal regeneration templates for primary bruns surgery in a UUK regional bruns centre	retrospective case series	94	MatriDerm® (n = 59)	Integra® DRT (n = 35)	one-step for Matriderm®	Integra®-treated patients had an average percentage TBSA burn of 20.4% +/- 18.9, while for Matriderm®-treated patients it was 1.7% +/- 1.3. The graft take rate was 84% +/- 33.3 for Matriderm® and 72.9% +/- 39.1 for Integra®. Major infections were seen in 3 out of 59 Matriderm®-treated patients and 11 out of 35 Integra®-treated patients. Six patients in the Integra® group experienced complete loss of autograft compared to two patients in the Matriderm® group. Burn contractures were observed in 21 patients treated with Integra® and 15 patients treated with Matriderm®. There was no significant difference in haematoma development, hypertrophic scarring, or the need for secondary reconstructive surgery in both groups. Patients treated with Integra® had a mean time of 44.1 days to healing of the DRT treated area, comparedto Matriderm®-treated patients, who took 20.1 days to heal. Furthermore, Integra®-treated patients took longer to achieve a 95% healing of all burnt areas than Matriderm®-treated patients (66 days vs. 40.2 days).
Zajíček	2020	Acta Chir.Plast	DERMAL REPLACEMENT WITH MATRIDERM® - FIRST EXPERIENCE AT THE PRAGUE BURN CENTRE	case series	10	MatriDerm® + STSG			Matriderm® was used in the treatment of skin loss in ten patients. The average healing time was 19.6 days, with good functional results and without serious infectious complications.
Karakol	2021	J Plastic Surgery and Hand Surgery	Recent strategic approach in postburn extremity scars and contractures	case series	29	Matriderm® + STSG + stem cell, fat and PRP injection		one-step	There were statistically significant improvements in postoperative range of motion, with a mean preoperative score of 36.14 ± 5.91 increasing to 74.31 ± 6.96 postoperatively, representing a significant increase ($p < 0.05$). There were also significant decreases in all Patient and Observer Scars Evaluation Scale factors between preoperative and postoperative scores, with mean scores decreasing from 6.55 ± 0.20 to 3.93 ± 0.24 for vascularity, from 6.62 ± 0.21 to 3.66 ± 0.23 for pigmentation, from 6.55 ± v0.21 to 3.55 ± 0.23 for thickness, from 6.72 ± 0.22 to 3.62 ± 0.30 for relief, from 7.17 ± 0.23 to 3.34 ± 0.24 for pliability, and from 6.72 ± 0.21 to 3.55 ± v0.24 for surface area, respectively ($p < 0.05$ for all factors).

Burns / contracture

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Correa	2022	Wound Rep Regener	Evaluation of contraction of the split-thickness skin graft using three dermal matrices in the treatment of burn contractures: A randomised clinical trial	RCT	39	MatriDerm® (n = 9)	Pelnac (n = 10), Integra® (n = 10) no dermal template (n = 10)	one-step	A clinical trial compared the efficacy of dermal matrices in reducing skin contractures in patients with burn injuries. Patients were randomly assigned to groups treated with Integra®, Pelnac®, Matriderm® matrices or a control group with only skin graft. At 12 months post-surgery, the control group had lower rates of skin graft contraction than the matrix groups. Pelnac® resulted in larger skin graft contraction than Matriderm® and Integra®, while the differences between Integra® and Matriderm® were not significant. The study concluded that dermal matrices did not reduce or avoid the occurrence of late skin graft contraction in these patients.
Park	2022	Journal of Korean Burn Society	The Treatment of Chronic Postburn Scar and Contracture: A Case Report	case report	1	MatriDerm® + STSG	none	one-step	This case study reports the successful treatment of severe contracture and scarring in a patient's right arm, shoulder, and chest using MatriDerm®. The patient had limited mobility in her shoulder and elbow, which led to scoliosis. The surgery involved removing scar and contracture tissue and replacing it with a dermal substitute, MatriDerm®, which was then covered with a split-thickness skin graft. The skin graft was well transplanted, and the patient achieved better mobility and satisfaction with daily activities. This case study highlights the potential benefit of using MatriDerm® in contracture release surgery.
Young Lee	2022	Analyt Cellular Pathol	Immunohistochemical analysis of post burn scars following treatment using dermal substitutes	comparative clinical study		MatriDerm® + STSG (n = 11)	AlloDerm® + STSG (n = 18), FTSG alone (n = 6), STSG alone (n = 28), normal skin (n = 63)		Based on the study results, MatriDerm® showed comparable histopathological characteristics to normal skin, as there were no significant differences in elastin, collagen III, stromal CD31, α-SMA, CD31 vessel width, stromal α-SMA, vessel quantity and width, and laminin length. Additionally, MatriDerm® had significant differences in CD31 vessel numbers compared to full-thickness skin graft (FTSG) and in CD31 vessel width compared to FTSG, split-thickness skin graft (STSG), and normal skin. MatriDerm® also had lower levels of α-SMA stroma compared to FTSG, AlloDerm®, and normal skin. Finally, MatriDerm® showed a similar level of collagen I to AlloDerm® and STSG and a significantly higher level than FTSG and normal skin. These results suggest that MatriDerm® may be an optimal alternative to address the cosmetic and functional limitations posed by other treatment methods for post-burn hypertrophic scars.
Dickson	2023	J Burn Care Res	A Histological and Clinical Study of MatriDerm® use in Burn Reconstruction	case series	8	Matriderm®		one-step	A study was conducted in which ten sites were reconstructed with MatriDerm® and an immediate split thickness skin graft. Results showed evidence of early vascularization and an inflammatory infiltrate within the first two weeks, and MatriDerm® was resorbed earlier than other dermal substitutes, with evidence of resorption by week 3 and complete replacement by a neodermis at 2 months. The thickness of the dermis from the skin graft showed a significant increase from week 1 to month 12, with the relative contribution of the skin graft dermis to the total dermal thickness being small. Increased collagen density in the lower reticular dermis was observed in all specimens, with collagen fragmentation and dispersion seen as the scar matures. Patient-reported outcomes included improved outcomes in itching, pain, appearance, dryness, pliability, sensation, and activities of daily living. However, the mean mVSS did not show a significant change over the study period (preoperative, 7 +/- 3 versus month 12, 7 +/- 3; p = 0.310).

Trauma

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Yi C.R.	2015	Journal of Korean Burn Society	The capacity of 2 mm MatriDerm® as a dermal substitute in single stage skin resurfacing	retrospective case series	5	MatriDerm® (2 mm) + unmeshed STSG (compressive dressing 0.9% saline soaked gauzes)	none	one-step (with 2 mm MatriDerm®)	The article reports on the successful use of 2 mm thickness Matriderm® as a dermal substitute in single-stage skin grafting procedures for soft tissue reconstruction, in five patients with trauma injuries or donor site harvest. The results showed good skin-quality and coverage of tissues, with more dermal collagen and enhanced skin elasticity compared to 1mm Matriderm®. The use of 2 mm thickness Matriderm® reduced hospital days and decreased infection risks, making it a time and cost-effective procedure. Grafts showed good adherence to the wound bed 2 weeks after surgery. Success rate was 100%. all patients were returned to daily life and work. Mean period for graft taking 12.2 days. Mean area of defects 38.1cm^2.
Ryssel H.	2010	Int Wound J	Single-stage MatriDerm® and skin grafting as an alternative reconstruction in high-voltage injuries	retrospective case series	9	MatriDerm® + STSG		one-step	The retrospective analysis involved nine male patients between the ages of 19 and 54 who were referred for the reconstruction of exposed bone, joint capsule, or tendons due to severe high-voltage injuries. The patients underwent a single-stage procedure using Matriderm® and skin grafting, with a mean of 1.6 operative procedures before definite wound closure. Six of the nine patients required only one skin grafting procedure, while two patients underwent regrafting with Matriderm®, and one patient required a secondary free flap due to wound infection. The success rate was 89%, and the median follow-up was 30 months. The mean hospital stay was 61 days, with a mean rehabilitation time of 12.7 months, and 60% of the patients returned to work after treatment.

Trauma

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Cervelli V.	2011	Int Wound J	The use of MatriDerm® and skin grafting in post-traumatic wounds	randomized controlled trial	60	MatriDerm® + STSG (n = 30)	STSG alone	one-step	Two weeks after the first treatment, 95% of wounds treated with MatriDerm® and skin graft showed a re-epithelisation, whereas it was 75–80% in the control group. Significant higher percentage re-epithelialization at 3 months. All the scores associated with the items of Manchester Scar Scale were significantly better for MatriDerm® group, especially in colour, appearance and contour.
Gümbel	2016	Journal of German Society of Dermatology	Retrospective analysis of 56 soft tissue defects treated with one-stage reconstruction using dermal skin substitutes	retrospective study	56	MatriDerm® (1mm)		one-step	In this study of 56 patients, the method was used successfully to cover defects on both upper and lower extremities, including amputation stump coverage. The graft healed without complication in 73.2% of patients, and only one patient experienced graft failure. 26.8% of patients experienced impaired wound healing but did not require additional surgical procedures. None of the patients required extensive plastic surgery.
Nakhi	2020	Wounds Middle East	The use of MatriDerm® and skin graft for reconstruction of complex wounds	case series	20	MatriDerm® + STSG		one-step	The use of MatriDerm® for reconstruction using STSG resulted in an average engraftment rate of 80.25 ± 32%. The mean time of complete wound healing was 23.7 days. Out of the 20 patients grafted with MatriDerm® and STSG, only one had a serious long-term complication, and there were no mortalities. Patient satisfaction scores showed that 42% of patients were very satisfied, 36.8% were relatively satisfied and 21% were unhappy with the outcome. The use of MatriDerm® reduced haematoma formation and improved scar properties.
Lempert	2021	Clin Case Rep	Salvage of a mangled limb with Matriderm® augmented split-skin grafting and maggot biodebridement	case report	1	MatriDerm® (1mm) + STSG		one-step	A case of a young woman with a mangled leg that could be salvaged with a combination of negative pressure wound therapy, Matriderm® augmented split-skin grafting, and maggot biodebridement.
Lempert	2021	Langenbeck's Archives of Surgery	Long-term experience with a collagen-elastin scaffold in combination with split-thickness skin grafts for the treatment of full-thickness soft tissue defects: improvements in outcome a retrospective cohort study and case report	retrospective cohort study and case report	45	MatriDerm® + STSG		one-step	The study involving 45 wounds (44 affecting lower extremities), resulting from different types of injuries in 43 patients, found that the success rate of Matriderm® (MD)-augmented split-thickness skin grafting was about 90%. The recurrence rate of the treated wound defects that required revision surgery was 0% for the soft tissue complications from closed fracture group, 11.1% for the open fracture group, and 9.5% for the soft tissue group. The duration of VAC therapy differed significantly between the groups, with 10.8 days for the soft tissue complications from closed fracture group, 22.7 days for the open fracture group, and 12.6 days for the soft tissue group. The use of negative pressure wound therapy (NPWT) resulted in a significant reduction of bioburden, with a bacterial shift of -2.25 (1.89) for the soft tissue complications from closed fracture group, -1.9 (1.37) for the open fracture group, and -2.6 (2.2) for the soft tissue group.
Wallner	2022	European Journal of Trauma and Emergency Surgery	Long-term results of split-thickness skin grafting with and without additional dermal matrix in severe traumatic soft tissue defects of the lower limb	retrospective controlled	147	MatriDerm® + STSG (n = 79)	STSG alone (n = 55)	One and Two step (n = 15)	The study included a total of 147 cases (134 patients and 13 patients with both legs involved). Of these, 63 soft tissue defects in 55 patients were treated with STSG alone (group 1), while 84 severe soft tissue defects in 79 patients were treated with STSG in combination with MatriDerm® (group 2). The wounds in group 2 were more severe (85% had exposed tendon, muscle, or bone) compared to group 1 (0% had only dermis involved). The overall healing rate (number of patients with take rate ≥ 75%) was 88/147 (60%). In group 1, the healing rate was 42/63 (67%) compared to group 2, with a healing rate of 46/84 (55%) (p = 0.15). The difference in wound complexity between the treatment groups did not significantly impact the healing rate or the scar tissue quality 12 months postoperatively. Surgical revisions were necessary in about 25% of the cases, with the number of revisions being slightly higher in group 2 (3.4 ± 2.4) compared to group 1 (2.6 ±1.5; p = 0.03). However, in the subgroup analysis depending on different exposed soft tissues, the group with exposed muscle showed a trend towards better Vancouver Scar Scale (VSS) results after using STSG in combination with MatriDerm® (VSS = 4.4 points) compared to STSG only (VSS = 5.3 points) (p = 0.112). Additionally, the number of days in the hospital was significantly less in group 1 (26 days ± 17 days) than in group 2 (36 ± 19 days) (p = 0.001), indicative of the difference in wound severity. In summary, the study suggests that STSG and additional MatriDerm® application can be a satisfactory alternative for dermis replacement in patients with severe skin defects.
Mello	2022	Wounds https://www.hmpgloballearningnetwork.com/site/wounds/case-series/dermal-regeneration-matrix-treatment-acute-complex-wounds	Dermal Regeneration Matrix in the Treatment of Acute Complex Wounds	case series	20	MatriDerm® (1mm and 2mm)	None	Yes (n = 6) No (n = 14)	MatriDerm® 1 and 2mm, when used in a two-step procedure with skin grafting after 7 to 9 days and combined with negative pressure wound therapy (NPWT), achieved dermal regeneration and skin graft integration rates of almost 100% in all cases, with no complications. The Vancouver Scar Scale (VSS) scores at a 12-month follow-up ranged from zero to 6 (average, 2.25 ± 0.65), indicating good subjective evaluation results in terms of integration of MatriDerm® and skin grafts.

Soft tissue defects

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Heckmann A.	2011	Der Unfallchirurg	One-stage defect closure of deperiosted bone and exposed tendons with MatriDerm® and skin transplantation. Possibilities and limitations [article in German]	prospective, case series	10	MatriDerm®	none	two-step (two-stept in all cases)	In nine of ten patients complete defect coverage could be achieved. A one-stage wound closure in extensive defects with exposed tendons in four of five locations could be achieved. In deperiosted bone defects the one-stage coverage was only successful in two of six patients. Complete wound closure could be achieved with a second skin transplantation in patients with exposed tendon and bone in three of the four locations. As a one or two stage procedure MatriDerm® application with skin transplantation resulted in an effective defect closure without the need for an complex plastic reconstructive procedure.
Pasternak I.	2014	52. Jahrestagung der ÖGPÄRC	Subcutane Polsterung des Ramus superficialis Nervi radialis mit MatriDerm® Ein Fallbericht [article in German]	case report	1	MatriDerm®	none	one-step	MatriDerm® was used for successful augmentation of the subcutis cushioning R. superficialis n. radialis.
Morozzo U.	2015	Indian J Surg	Soft tissue reconstructions with dermal substitutes versus alternative approaches in patients with traumatic complex wounds	prospective	52	25 (standard choice Integra®) mean age 50 years	27 gold standard (local flaps, free flaps, dermo-epidermal autografts) mean age 44 years	one-step (only with MatriDerm®)	Patients with dermal substitutes experienced a generally faster healing process (67.7 versus 70.1 days), reduced overall hospitalization time (9.71 versus 9.96 days), less invasive procedure, significant lower surgery time ((46.3 versus 142.8 min)), more pathological scarring, less surgical costs (5672.14 ± 2900.1 6369.44 ± 3062.1).
De Vries H.	1995	British Journal of dermatology	Reduced wound contraction and scar formation in punch biopsy wounds. Native collagen dermal substitutes	prospective, intra-individual study	8 (7)	native collagen sponge	no treatment; collagen sponge coated with alpha-elastin; coated with fibronectin, coated with hyaluronic acid	n.ap	Wounds epithelialized in 7-10 days. Control wounds showed most wound contraction: 20% with significant difference between control and coated with fibronectin and coated with elastin. After 6 weeks no collagen fibers from dermal templates were detected anymore. Fibronectin and elastin coated groups showed rete-ridges collagen bundles, indicating better dermal-epidermal connection. At 3 months elastin coated group showed collagen network similar to normal dermis.
Abed S.	2014	Annales de Dermatologie et de venereologie	The place of skin substitutes in surgical treatment of necrotizing cellulitis: Seven cases [French]	case series	7	MatriDerm® + STSG (1 patient) and Integra® (6 patients)		one-step (Integra® 2 step)	Excellent elasticity and flexibility. Good recovery and functionality. No need for second time general anesthetic with MatriDerm®. Example of clinical case with MatriDerm® and exposed tendon.
Gümbel	2016	Journal of German Society of Dermatology	Retrospective analysis of 56 soft tissue defects treated with one-stage reconstruction using dermal skin substitutes	retrospective study	56	MatriDerm® (1mm)		one-step	In this study of 56 patients, the method was used successfully to cover defects on both upper and lower extremities, including amputation stump coverage. The graft healed without complication in 73.2% of patients, and only one patient experienced graft failure. 26.8% of patients experienced impaired wound healing but did not require additional surgical procedures. None of the patients required extensive plastic surgery.
Vilela	2017	World Neurosurgery	Matriderm® for the management of scalp necrosis following surgical treatment of a giant parietal encephalocele.	case report	1	MatriDerm® (1mm) + STSG		one-step	The use of MatriDerm® layered directly over the brain tissue in combination with a split-thickness skin graft proved to be a simple technique with minimal morbidity and resulted in a stable wound with a good result (rapid engraftment, without any further complications, with an acceptable cosmetic result in long term follow-up)
Mitwalli	2019	Egypt J Plast Reconstr Surg	Evaluation of the use of single stage dermal substitutes in acute and chronic wounds of the hands	comparative clinical study	85	MatriDerm® (1mm) + STSG (n = 55)	STSG alone	one-step	The study included 85 adult patients with acute and chronic hand wounds. The outcomes were assessed using the Vancouver Scar Scale, histopathological examination, range of motion, and patient satisfaction. Complete healing time between 21-25 days in both groups. Regrafting needed in 4 patients (7%). Significant VSS scores for MatriDerm® group (4.9 +/- 0.8). 100% patient satisfaction: 45%; 80% satisfaction: 45% Histology confirms newly formed dermis. The use of dermal substitutes showed significant differences in outcomes compared to skin grafting alone, with promising results reported for acute burns and chronic wounds.
Hones	2023	Jounral of wound care	Treatment of complex extremity wounds with MatriDerm®: first clinical experience in the US	retrosprective case Series	11	MatriDerm®		two-step n = 6 without grafting n = 2 with delayed grafting	The study reviewed the first US inpatient clinical experience with MatriDerm® for treatment of such difficult wounds in 11 patients with medical comorbidities or social issues. The wounds were in the forearm, hand, leg, and feet, with vital structures exposed that included bone (n = 3), tendon and bone (n = 1), and tendon (n = 7). The mean area of the wounds was 59.2 cm^2 (range: 2 to 230). In the series, eight wounds healed, six with MatriDerm® only and two after delayed skin grafting. The mean time to wound healing in patients treated with MatriDerm® only was 49 days (range: 7 to 84), and 44.5 days (range: 32 to 57) in the two patients who required delayed skin grafting. MatriDerm® has potential as an alternative to flap coverage in patients who are not good candidates for flap surgery.
Lee	2023	Annals of Plastic Surgery	Management of Hardware-Exposed soft Tissue Defects Using Dermal Substitutes and Negative Pressure Wound Therapy	retrospective case series	14	MatriDerm®		one-step	14 patients with hardware-exposing wounds after internal fixation using plates were treated with the wound management procedure, involving surgical debridement, MatriDerm® placement, and negative pressure wound therapy (NPWT). The duration of treatment and number of NPWT replacements were stratified based on injury type, with open fractures requiring significantly longer NPWT and undergoing more replacements. Patients with open fractures underwent a mean of 6.6 NPWT changes while those with closed fractures underwent 2.5 (P = 0.002). However, skin grafting with MatriDerm® was successful in all 14 patients. The study reveals that NPWT and MatriDerm®-augmented skin grafting are useful for hardware-exposed wounds, where flap surgery has been considered the only treatment.

Donor sites

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes/Summary
Park T.	2015	Maxillofacial Plastic and Reconstructive Surgery	Double layered collagen graft to the radial forearm free flap donor sites without skin graft	case series	22	MatriDerm® (bottom) in combination with Terudermis (top)	none	one-step	The scar area was decreased to 63.9% in average. The complete healing was obtained between 1.5 and 3 months according to the defect size. There was no functional defect or impairment 3 months after operation. Patients were satisfied with the aesthetic and functional results Major advantage: skip surgical step for STSG harvesting and avoid STSG donor site morbidity, delayed healing period compared with MatriDerm® in combination with STSG (over 3 months compared with 4-6 weeks).
Dunne J.	2014	ePlasty	A previously discounted flap now reconsidered: MatriDerm® and split-thickness skin grafting for tendon cover following dorsalis pedis fasciocutaneous flap in lower limb trauma	case report	1	MatriDerm® + STSG		one-step	MatriDerm® successfully used at donor site. Three months postoperatively, the foot had excellent function and cosmesis, with toes in a neutral position and a full range of movement.
Min J.	2014	Arch Plast Surg	The Use of MatriDerm® and Autologous Skin Graft in the Treatment of Full Thickness Skin Defects	retrospective case series	31	MatriDerm® + STSG		one-step	Graft survival rate 96.7%. Wound epithelialization within 2 weeks. The elasticity value of the portion on which MatriDerm® was applied was 0.765, trans-epidermal water loss was 10.0 g/hr/m^2, and the humidification value was 24.0. The levels of erythema and melanin were 352.0 arbitrary unit (AU) and 211.0 AU, respectively. When comparing the values of elasticity and TEWL of the skin treated with MatriDerm® to the values of the surrounding skin, there was no statistically significant difference between the groups.
Watfa	2017	J Sex Med	MatriDerm® Decreases Donor Site Morbidity After Radial Forearm Free Flap Harvest in Transgender Surgery	retrospective nature of the prospective database	37	split thickness skin graft with MatriDerm® (n = 29)	full-thickness skin graft (n = 8)	one-step	In a study evaluating the use of MatriDerm® for radial forearm free flap (RFFF) donor sites, favorable outcomes were reported. All 37 patients survived, with no full or partial necrosis reported. Donor site complications were minimal, with only one patient in the dermal substitute group experiencing a hematoma that did not affect graft take. Sensory outcomes were particularly favorable, with better sensory return in the dermal substitute group as demonstrated by an average Semmes-Weinstein monofilament value of 6.96 ± 1.11 for A1 and 7.27 ± 1.12 for A2, compared to 14.26 ± 2.07 for A1 and 15.58 ± 1.43 for A2 in the FTSG group. In addition, the average DASH score was significantly lower in the dermal substitute group (0.43 ± 0.15) compared to the FTSG group (14.17 ± 3.83), and esthetic scores were also significantly higher in the dermal substitute group ($P < .0001$). In conclusion, these findings suggest that the use of MatriDerm® for RFFF donor sites can lead to decreased morbidity and improved clinical outcomes.
Cristofari	2019	ANNPLA	Coverage of radial foream flap donor site with full thickness skin fragt and MatriDerm®: An alternative reliable solution?	retrospective comparative study	43	MatriDerm® + FTSG and MatriDerm® + STSG	FTSG	one-step	Study yo evaluate a new technique for forearm coverage with artificial dermis, using full-thickness skin graft (FTSG) with Matriderm®. The study showed that FTSG with Matriderm® resulted in improved residual functionality, skin quality, aesthetic result, and satisfaction scores compared to other techniques. The mean DASH score was 10.6/100 and the mean VSS score was 5.5/13. Mean surgeon and patient satisfaction scores were 3/5 in the FTSG with Matriderm® group. FTSG + MatriDerm® showed improved DASH (11/100) and VSS scare (6/13), mean surgeon satisfaction scar 3/5 (5 best), mean patient satisfaction 3/5 (5 best); Take rate (1 month post-op): 89,6%. STSG + MatriDerm® showed improved DASH (17/100 and VSS score (7/13), mean sugeon satisfacion score (2,64/5), mean patients satisfaction 2,42/5; Take rate (1 month post-op): 86,7%.
Abbate	2020	The Journal of Craniofacial Surgery	The use of dermal substitutes for Donor Site Closure After Radial Forearm Free Flap Harvesting	retrospective study	18	MatriDerm® + STSG (1mm, n = 9)	STSG	one-step	The study analyzed 18 patients and compared the outcomes between a STSG closure and the use of MatriDerm®. Patients treated with MatriDerm® + STSG obtained a better result in both aesthetic and functional outcomes. The difference in circumferences between the operated and contralateral limbs was statistically significant ($P < 0.004$) with a difference of 1.2 mm proximal and 1.3 mm distal. The average Vancouver Scar Scale (VSS) was 1.75 ± 0.2 for the MatriDerm® + STGS group compared to 1.82 ± 0.2 for the STSG group. The Disabilities of the Arm, Shoulder, and Hand (DASH) score was 19.4% in the MatriDerm® + STGS group compared to 21.8% in the STSG group.
Burger	2023	Indian J Surg	Donor Site Defect Coverage of the Forearm with Dermal Substitute After Harvesting Radial Forearm Free Flap for Phalloplasty: Is MatriDerm® Worth the Effort?	case series	42 (21/21)	MatriDerm®	FTSG	one-step	The use of MatriDerm® in phalloplasty donor site defect coverage significantly decreased the incidence of complications, including wound healing disorders and reoperation rates, compared to full-thickness skin grafts from the groin area. MatriDerm® showed an average duration of hospital stay of 20 days, with no reported neuromas of the superficial branch of the radial nerve. The Clavien-Dindo classification for MatriDerm® resulted in 20 grade 0, 1 grade 1, and no grades 2-5 complications. In comparison, the FTSG resulted in 16 grade 0,3 grade 1,0 grade 2,2 grade 3, and no grades 4-5 complications. Overall, the use of dermal templates such as MatriDerm® is considered worth the additional effort and costs in this patient population.

Cancer excisions

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes/Summary
Healy C.	2011	BAPRAS (British Association of Plastic, Reconstructive and Aesthetic Surgeons) Meeting [Abstract]	Improving Reconstruction of Skin Cancer Excision Defects with Single-Stage Artificial Dermal Substitute (MatriDerm®) and Thin Split-Skin Graft	case series, retrospective analysis	70	MatriDerm® + thin split-thickness skin graft	none	one-step	The majority of patients had an excellent cosmetic result with reduced wound contracture, improved skin pliability and elasticity and markedly reduced contour defect to what would be expected with a split-thickness skin graft alone. There were no local or systemic allergic complications associated with the MatriDerm® template application. Marked improvement in the quality of the reconstruction in terms of contour defect, skin elasticity, and graft stability.
Pauchot J.	2012	Dermatol Surg	Dermal equivalents in oncology: benefit of one-stage procedure.	retrospective case series	16	MatriDerm® + STSG	Integra®	MatriDerm® 1-step, Integra® 2-step	Wound healing times with MatriDerm® were 4 weeks less than those with Integra®. Three cases of infection were noted with Integra® (75%), versus 0% with MatriDerm®. Times to skin grafting with Integra® were between 3 and 8 weeks. Mean healing time: 10 weeks.
Bertolli E.	2013	Int Wound J	Artificial dermis (MatriDerm®) followed by skin graft as an option in dermatofibrosarcoma protuberans with complete circumferential and peripheral deep margin assessment.	case report	1	MatriDerm® (2mm) alone		n.ap	MatriDerm® 2mm was used prior to final reconstruction, to cover the exposed skull defect. At 4 weeks the wound was completely granulated. Incl. case photo's.
Lamy J.	2013	Ann Chir Plast Esthet	[Use of MatriDerm® 1mm in reconstructive surgery. Series of 31 cases]. [Article in French]	prospective case series	28	MatriDerm® + STSG		one-step	The use of 1mm MatriDerm® has been evaluated for reconstructive surgery in patients with tissue losses after limb or trunk sarcoma resection, melanoma, extended baso- or spinocellular carcinoma, palmoplantar keratodermy, burn sequels, or traumatic tissue losses. The results showed a mean taken rate of 87 +/- 19% of the area, a mean day of discharge of 4.8 days, and satisfying aesthetic and functional results. Mean costs/patient: Euro 906.5.
Kappos E. (Kalbermatten)	2014	Case reports in Medicine	Bovine Dermal Matrix as Coverage of Facial Nerve Grafts	case report	1	MatriDerm® + STSG		one-step	The use of MatriDerm® and split thickness skin graft was a safe, easy, and fast alternative for covering soft tissue defects, even on wound grounds containing nerve grafts. No postoperative complications were reported. Uneventful healing. Aesthetic result and soft tissue mobility acceptable.
Park	2016	Arch Craniofac Surg	Immediate Near-Total Scalp Reconstruction with Artificial Dermis on Exposed Calvarium	case report	1	MatriDerm® and meshed STSG		one-step	In a 78-year-old woman, successfull perfomance of a single-stage reconstruction of a large scalp defect using a combination of MatriDerm®, split-thickness skin graft following wide excision of a cutaneous angiosarcoma. No wound infection or other complications reported up to 13 month postoperatively.
Pauchot	2016	Annales de chirurgie plastique esthétique	Conformation du lambeau antébrachial en arche sur mesure pour la reconstruction du voile du palais. Cas clinique	case report	1			one-step	MatriDerm® is used to cover the doner site (60-year-old male) of a "double-arched" flap design for reconstructing soft palate defects after oncologic resection.
Campagnari	2017 a	International Journal of Surgical Oncology	Dermal Substitutes Use in Reconstructive Surgery for Skin Tumors: A Single-Center Experience	single-center study	13	MatriDerm® (n = 12) Integra® (n = 1)		two-step	This article reports on a single-center experience using dermal substitutes in reconstructive surgery for skin malignancies. Among 13 patients, the most common diagnosis was basal cell carcinoma (38.5%), and the most frequent sites of injury were the scalp (53.8%) and lower limbs (23.1%). The use of MatriDerm® 2mm (46.2%) and NPWT (46.2%) were common. The average time to second-stage skin grafting was 43.9 days, and the most frequent complication of the first stage was wound contamination (38.5%). The study concluded that the use of dermal substitutes provides good aesthetical and functional results in reconstructive surgery for skin malignancies. Three patients experienced tumor recurrence, and one patient died due to disease progression.
Wollina U.	2017 a	Maced J Med Sci	Very Rare Amelanotic Lentigo Maligna Melanoma with Skull Roof Invasion	case report	1	MatriDerm® + meshed skin graft		one-step	In a 73-year-old male patient LMM was removed by slow Mohs. 1 year later, another skin coloured nodule of the bald head was removed by slow mohs surgery. The defect was closed by sandwich transplantation with MatriDerm® and meshed skin graft. Healing was uneventful. Again 1 year later, a firm tumour proliferation around the skin transplant occures (LMM). Wide excision of the tumor. Defect was again closed by sandwich transplantation.
Mahabbat	2018	ePlasty	Functional Subunit Reconstruction of Giant Facial Congenital Melanocytic Neci in Children With the Use of Matriderm® and Skin Graft: Surgical Experience and Literature Review	case report	1	MatriDerm® + STSG		one-step	A case study of an 8-year-old boy with a facial giant congenital melanocytic nevus was presented. The surgical reconstruction involved the use of a partial-thickness scalp skin graft aided with Matriderm® dermal substitute, resulting in a favorable scar and no donor site complications such as alopecia or hypertrophic scar. The postoperative result was satisfactory with minimal residual nevus around the eye. Resection of facial congenital melanocytic nevi, followed by single-stage reconstruction using Matriderm® and skin graft, is an excellent and fast reconstructive method with promising aesthetic outcomes and greater improvement in physiological outcome, especially in the pediatric population.

Cancer excisions

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Moon	2019	PRAS	Tissue-engineered dermis grafts using stromal vascular fraction cells on the nose: A retrospective case-control study.	retrospective case control study	47	MatriDerm® (3-5 layers)	MatriDerm® + SVF cells	two-step	This study compared tissue-engineered dermis with stromal vascular fraction (SVF) cells to artificial dermis to cover defects after surgical excision of basal cell carcinoma on the nose in 77 patients. The tissue-engineered dermis group showed a significantly lower total scar assessment score (11.3 ± 2.0) than the artificial dermis group (12.8 ± 2.9) in the Patient and Observer Scar Assessment Scale (POSAS) (P = 0.031) and lower total scores regarding the observer-assessed OSAS evaluation (11.2 ± 1.8 vs. 13.1 ± 3.6, P = 0.028). All grafts were successful, with no significant adverse events or BCC recurrence during a mean follow-up period of 35.0 ± 17.5 months. The time for re-epithelialization in the two groups was similar.
Sang-Woo Kang	2019	Cancer Management and Research	Skin graft using MatriDerm® for plantar defects after excision of skin cancer	case report	2	MatriDerm®		two-step	Clinical outcomes Case 1: - 66 year old woman, chronice ulceration on the plantar surface for 8 month, Bowen's desease; photodynamic therapy, + wide excision of cancer. - plantar fascia and lateral plantar neurovascular bundle were exposed through skin defect; covered with MD + NPWT; NPT changed every week; one week later + STSG - 8 weeks after surgery: complete healing; no complication (like infection); no functional problems of the foot; numbness on the distal lateral side of the food, which gradually improved Case 2: - 69 year old male; pigmented skin lesion; melanoma - wide excision; plantar fascia was exposed; covered with MatriDerm® + NPWT; one weeek later + STSG - complete healing after 6 weeks; no complications, no functional problems
Shay	2019	Journal of Craniofacial Surgery	One-Step Triple-Layer Reconstruction of an Exposed Calvarium in a Radiated Tinea Capitis Patient	case report	1	MatriDerm®		one-step	A 78-year old femal with sqamous cell carcinoma: Cancer excision and 1-stage multilayered surgical reconstruction which included 3 pericranial turnover flaps to cover the exposed calvarium, MatriDerm®, which was placed above the pericrania flaps and a split-thickness skin graft to cover the entire defect. On post-OP day 4: MD+STSG were stable and intact. 3 weeks post-OP: complete healing of the wound. 16 weeks post-OP: no signs of wound breakdown nor signs of tumor recurrence. This technique provides an improved outcome, structurally and aesthically when compared with other dermal substitutes-based techniques, while avoiding unnecessary burring of the outer table of the calvarium.
Dell' Aversana Orabona	2022	J Clin Med	The Use of MatriDerm® for Scalp Full-Thickness Defects Reconstrution: A Case Series	retrospective case series	16	MatriDerm® + STSG		one-step (2 Two-Step)	A study was conducted on 16 patients who underwent scalp full-thickness tumor excision and reconstruction using Matriderm® dermal substitute and split-thickness skin graft. The outcomes were evaluated using the Vancouver Scar Scale. The results showed optimal wound healing, grafted skin similar to surrounding tissue, and a decrease in pigmentation and vascularity between 6 months and 1-year follow-ups. The Vancouver Scar Scale (VSS) was used to evaluate the surgical outcome during follow-ups recorded at 1 month, 6 months, and 1 year. The mean VSS score at 1 year was 16,875 with a range between 0 and 2, indicating a significant improvement in scar status. The highest improvements were observed in pigmentation and vascularity.
Na	2022	Archives of Craniofacial Surgery	Scalp reconstruction using the reverse temporalis muscle flap: a case report	case report	1	reverse temporalis muscle flap and MatriDerm® in exposed area + STSG	none		MatriDerm® was used in reconstructing a scalp ulcer due to partial loss of a skin graft RTFM (reverse temporalis muscle flap) was used as an alternatve to a free flap, Matriderm® was used to cover the area that the RTMF did not completely cover. The procedure was successful, the wound healed well, and MatriDerm® allowed for soft-tissue coverage and volume restoration.
Tran	2022	Cureus	Large Scalp Defect Reconstruction With Tissue Expansion, Orticochea Flap, and Acellular Dermal Matrix for Soft Tissue Augmentation: A Case Report	case report	1	MatriDerm® + Orticochea flap	none		A case report on a 53-year-old patient with skin cancers on the scalp. The patient underwent tissue expansion and Mohs surgery to remove the tumors and create a large full-thickness skin defect, which was then reconstructed with Orticochea flaps and MatriDerm® graft. The MatriDerm® graft was placed centrally for improved healing and circulation. During the one-month postoperative follow-up, there was no evidence of wound breakdown, infection, or necrosis.
Paganelli (Magnoni)	2023	Life	Wound Healing after Acellular Dermal Substitute Positioning in Dermato-Oncological Surgery: A Prospective Comparative Study	prospective comparative study (intra-individual)	10	MatriDerm®	Integra®	two-step, after 3 weeks	MatriDerm® and Integra® are ADMs commonly used in dermato-oncological surgeries. A study compared the two ADMs in 10 patients and found no significant differences in final clinical outcomes or extracellular matrix content of the neoformed dermis. However, MatriDerm® induced scar retraction more frequently, while Integra® was associated with higher infectious risk and slower reabsorption into the wound bed, along with foreign body-like granulomatous reactions. The VSS scores were comparable between the two ADMs (MatriDerm®: VSS: 6,1 +/-1,6 (3-8); Integra®: VSS: 5,7 +/-1,9 (2-8)) , though more evident wound bed contracture was evident in four cases in areas treated with MatriDerm® ($p < 0.05$). Histopathological evaluation revealed that MatriDerm® was reabsorbed more quickly than Integra®, with faster maturation of the granulation tissue and re-epithelization observed in some cases. The infection rate was higher in Integra®, which was more easily colonized by bacteria. Overall, both ADMs had similar vascularization of the wound bed and collagen/fibronectin content.

Chronic wounds

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes/Summary
Jeon H.	2013	Arch Plast Surg	Treatment of diabetic foot ulcer using MatriDerm® in comparison with a skin graft	prospective controlled	60	MatriDerm® + STSG (n = 30)	STSG alone (n = 30)	one-step	MatriDerm® group: LoS: 7.52 weeks ($p < 0.05$); wound epithelialization: 8.61 weeks ($p < 0.05$); 93.3% completely healed ($p < 0.05$); significant higher elasticity (elasticity ratio 0.72 (affected/non-affected side)) STSG alone: LoS: 9.22 weeks; wound epithelialization: 12.94 weeks; 80% completely healed; (elasticity ratio 0.19 (affected/non-affected side)).
Cervelli V.	2010	Int Wound J	The use of MatriDerm® and autologous skin grafting in the treatment of diabetic ulcers: a case report	case report	1	MatriDerm® + STSG		one-step	DFU of 35x25 cm, with prior Gentamycin treatment. 7 days post-op skin graft not completely taken, 14 days post-op total integration. After just a single treatment, obtained a reduction in ulcer after 15 days from the surgical treatment. Achieved a reduction in pain and exudate secretion of the ulcer. Almost complete restoration of the missing volume and good quality of skin. Case includes extensive description of surgical procedure. Wet application of MatriDerm®.
Wollina U.	2011	J Cutan Aesthet Surg	One-stage Reconstruction of Soft Tissue Defects with the Sandwich Technique: Collagen-elastin Dermal Template and Skin Grafts	prospective case series	23	MatriDerm® + STSG		one-step	Use of a sandwich technique combining a dermal collagen-elastin matrix with skin grafts to treat full-thickness soft tissue defects with exposed bone, cartilage, or tendons. The use of the dermal template resulted in a complete and stable granulation in 100% of wounds, with 17 defects showing complete closure and 19 achieving complete granulation with an incomplete closure. Healing time 9-14 days. Stable wound closure with very good aesthetic outcome. 74% of patients had very good or good aesthetic outcome. There was also a marked pain relief and a good aesthetic outcome. No adverse events were noted due to the dermal template usage, and the technique can be easily used in conjunction with intermittent negative pressure when necessary.
Wollina U.	2011	Int Wound J	Use of a collagen-elastin matrix for hard to treat soft tissue defects	case series	6	MatriDerm® + STSG		one-step	MatriDerm® in combination with meshed skin grafts was assessed in six patients with deep soft tissue defects that had exposed tendons, cartilage or bone. The outcomes were promising as healing was uncomplicated in all patients, complete wound closure was achieved, and the use of MatriDerm® reduced healing time with no adverse effects such as skin contracture.
De Angelis B.	2013	J Tissue Engineering	Chronic ulcers: MatriDerm® system in smoker, cardiopathic, and diabetic patients	case report	1	MatriDerm® + STSG		one-step	MatriDerm® with STSG used in a chronic ulcer. Decrease of limb oedema, full function restored. Skin volume restored and improvement of texture.
Mandel	2018	J Wound Care	Treatment of chronic infected post-oncological wounds with a dermal matrix: two case studies	case serie	2	MatriDerm®		two-step	Case 1: 76 year old male with chronic ulcer on the lateral region of the richt thigh. Two reconstruction procedures with a skin graft and dermal matrix fails before. Surgical hydrodebridement and reconstruction with dermal matrix, followed by the post-surgical dressing protocol. Neodermis was covered with STSG, followed by the same dressing protocol. uneventful course, result was very satisfactory to both the surgeon and the patient. Case 2: 46 old mal with laminin-332-deficient non-Herlitz junctional epidermolysis bullosa: reconstruction with a Integra® failed. sugical hydrodebridment and a new graft with a dermal matrix followed by postoperative dressing protocol. No reconstruction with skin graft, therefore the wound healed by secondary intention. Summary: complete wound healing, alsmost complete restoration of the missing colume and good quality of grafted skin.
Wollina U.	2018	Maced J Med Sci	The Role of Complex Treatment in Mixed Leg Ulcers – A Case Report of Vascular, Surgical and Physical Therapy	case report	1	MatriDerm® + meshed STSG		one-step	A case report of an 80-year-old female patient with a chronic leg ulcer of mixed arteriovenous origin on the left lower leg. The aim was to achieve complete and stable wound closure despite arterial occlusion, exposed tendon, and renal insufficiency. Benefits reported included percutaneous transluminal angioplasty, transcutaneous CO2, and deep ulcer shaving leading to successful wound closure by sandwich transplantation using MatriDerm® and meshed split skin graft. The patient had a 100% graft take with rapid reduction of severe wound pain.
Mitwalli	2019	Egypt J Plast Reconstr Surg	Evaluation of the use of single stage dermal substitutes in acute and chronic wounds of the hands	comparative clinical study	85	MatriDerm® (1mm) + STSG (n = 55)	STSG alone	one-step	The study included 85 adult patients with acute and chronic hand wounds. The outcomes were assessed using the Vancouver Scar Scale, histopathological examination, range of motion, and patient satisfaction. Complete healing time between 21-25 days in both groups. Regrafting needed in 4 patients (7%). Significant VSS scores for MatriDerm® group (4.9 +/- 0.8). 100% patient satisfaction: 45%; 80% satisfaction: 45% Histology confirms newly formed dermis. The use of dermal substitutes showed significant differences in outcomes compared to skin grafting alone, with promising results reported for acute burns and chronic wounds.
Buzea	2020	Journal of Clinical and Medical Images	Oneßstage closure of venous ulcers with MatriDerm® and Split Thickness Skin Grafts	case report	2	MatriDerm® + STSG and compresseion therapy		one-step	The article reports on two cases of large venous ulcers treated with MatriDerm® and split-thickness skin grafts in a one-stage procedure, combined with compression therapy. Graft take at day 5 was 100%, and follow-ups at 2 weeks, 1 month, 3 months, and 6 months revealed no signs of recurrence. The use of MatriDerm® in a one-stage procedure could lead to reduced hospitalization costs.

Tendon / Adhesion barrier

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Morozzo U.	2015	Indian J Surg	Soft tissue reconstructions with dermal substitutes versus alternative approaches in patients with traumatic complex wounds	prospective	52	25 (standard choice Integra®) mean age 50 years	27 gold standard (local flaps, free flaps, dermo-epidermal autografts) mean age 44 years	one-step (only with MatriDerm®)	Patients with dermal substitutes experienced a generally faster healing process (67.7 versus 70.1 days), reduced overall hospitalization time (9.71 versus 9.96 days), less invasive procedure, significant lower surgery time ((46.3 versus 142.8 min)), more pathological scarring, less surgical costs (5672.14 ± 2900.1 6369.44 ± 3062.1).
Petschke F.	2015	JPRAS Open	Novel Tortilla method for applying MatriDerm® around dissected nerves and tendons	case report	1	MatriDerm®	none	one-step, applied as protective matrix	This novel method offers an easy technique to achieve a complete coverage of the dissected structure.
Wetzig T.	2009	Dermatology	New indications for artificial collagen-elastin matrices? Covering exposed tendons	case report	1	MatriDerm® + STSG		one-step	80 year old patient, with co-morbidities with defect due to carcinoma on hand. Exposed tendons. Wet application of MatriDerm®. After 7 days and 3 weeks promising results. Completely healed at 6 months.
Ryssel H.	2010	Int Wound J	Single-stage MatriDerm® and skin grafting as an alternative reconstruction in high-voltage injuries	retrospective case series	9	MatriDerm® + STSG		one-step	The retrospective analysis involved nine male patients between the ages of 19 and 54 who were referred for the reconstruction of exposed bone, joint capsule, or tendons due to severe high-voltage injuries. The patients underwent a single-stage procedure using Matriderm® and skin grafting, with a mean of 1.6 operative procedures before definite wound closure. Six of the nine patients required only one skin grafting procedure, while two patients underwent regrafting with Matriderm®, and one patient required a secondary free flap due to wound infection. The success rate was 89%, and the median follow-up was 30 months. The mean hospital stay was 61 days, with a mean rehabilitation time of 12.7 months, and 60% of the patients returned to work after treatment.
Abed S.	2014	Annales de Dermatologie et de venereologie	The place of skin substitutes in surgical treatment of necrotizing cellulitis: Seven cases [French]	case series	7	MatriDerm® + STSG (1 patient) and Integra® (6 patients)		one-step (Integra® 2 step)	Example of clinical case with MatriDerm® and exposed tendon. Excellent elasticity and flexibility. Good recovery and functionality. No need for second time general anesthetic with MatriDerm®.
Graf	2017	White Paper	First experiences with the use of MatriDerm® in the prevention of tendon adhesions in foot surgery	retrospective case series	11	MatriDerm®			All patients had a very satisfactory functional outcome and no post operative complications were mentioned that were related to the use of MatriDerm®.
Gonzalez-Quevedo	2020	THE BONE & JOINT JOURNAL	Improving the regenerative microenvironment during tendon healing by using nanostructured fibrin/agarose-based hydrogels in a rate Achilles tendon injury model	animal		MatriDerm®	nanostructured fibrin-agarose hydrogel (NFAH) or genipin cross-linked nanostructured fibrin-agarose hydrogel (GP-NFAH)		The study investigated the effect of MatriDerm®, NFAH and GP-NFAH on Achilles tendon healing in rats. The results showed that NFAH and GP-NFAH had significantly higher tensile strength compared to MatriDerm®. In vivo evaluation of repaired tendons using NFAH, GP-NFAH and MatriDerm® resulted in better organization of collagen fibers and cell alignment than direct repair, with a better histological score in GP-NFAH.
Shim	2021	Journal of Wound Care	Preventing postoperative adhesions after hand tendon repair using acellular dermal matrix	Prospective open trial, case-control study	37	with MatriDerm® (acellular dermal matrix)	without ADM	one-step tendon repair	The use of MatriDerm® as a preventative measure for postoperative tendon adhesions after tendon injury was studied. At six months after surgery, the range of motion in the proximal interphalangeal joint was 81.0 ± 5.1 degrees in the ADM group and 75.8 ± 6.9 degrees in the control group, which was statistically significantly different ($p = 0.03$). In the distal interphalangeal joint, the range of motion was 79.9 ± 7.1 in the ADM group and 71.2 ± 5.7 degrees in the control group, which was statistically significantly different ($p < 0.05$). In addition, the total active motion was higher in the ADM group compared with the control group (231.5 ± 12.5 degrees versus 215.1 ± 17.1 degrees, respectively, $p = 0.04$). Patients' scores from the Patient Satisfaction Questionnaire were also significantly different, namely 8.9 ± 1.0 in the ADM group and 7.8 ± 1.4 in the control group ($p = 0.02$).

Miscellaneous

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Cervelli V.	2012	Int Wound J	Skin necrosis of scrotum due to endovascular embolisation: a case report	case report	1	MatriDerm® + split-thickness autograft	none	one-step	The skin was renewed, regenerated in volume and texture and the patient appeared to have a good healing of the skin color pigmentation and texture compared to the baseline. The scar tissue at the end of the treatment shows a net amelioration both in texture and pigmentation with absence of retraction in the scar tissue. On examination, no pain was experienced upon palpation as well as no evidence of adhesions and no restriction of movement in underlying tissues. No discomfort was experienced with garments and no alteration in functionality
Djedovic G.	2015	Eur J Plast Surg	Use of an acellular dermal template for defect coverage on the penile shaft	case report	1	MatriDerm® + split-thickness skin graft (with NPWT)	none	one-step	Natural and pleasing outcome with no sexual impairment and high patient satisfaction. Decreased length of inpatient treatment duration, less scar formation.
Duteille F.	2015	The Journal of Hand Surgery	MatriDerm® dermal substitute with split-thickness skin graft compared with full thickness skin graft for the coverage of skin defects after surgical treatments of congenital syndactyly: results in 40 commissures	retrospective, comparative	21	MatriDerm® + split-thickness skin graft (11 patients)	full-thickness skin graft (9 patients), 1 patient not reported	one-step	Matriderm® used for the treatment of congenital syndactyly. Reduction of surgical time by 10.5 min (19% reduction). OSAS score was equal to 11.9 (6-18) for the full-thickness graft and to 12.1 (6-20) for the Matriderm® group. Withey's score was 0.8 (0-3) in the full-thickness graft and 1.2 (0-3) in the Matriderm® group.
Kim Y.	2015	Journal of Korean Burn Society	A skin ulceration complicated by alcaligenes xylosoxidans infection	case report	1	MatriDerm® + split-thickness skin graft		one-step	Case report of a healthy patient who developed an A. xylosoxidans infection resulting in infectious skin ulceration with scar contracture that did not respond to traditional treatments. The patient underwent a wide excision and split-thickness skin graft with MatriDerm® due to the incurable nature of the infection. The article suggests that scar contracture can compromise blood circulation leading to A. xylosoxidans infection even in a healthy patient. The ulcer healed completely with MatriDerm®.
Özkan A.	2015	Journal of Cutaneous Medicine and Surgery	The use of the plasma blade and acellular dermal matrix in rhinophyma surgery: a case report	case report	1	MatriDerm® + split-thickness skin graft	none	one-step	Total excision of phymatous tissue and single session replacement of epidermal-dermal components is an effective treatment for patients with severe rhinophyma, resulting in satisfactory functional and aesthetic outcome.
Rha E.	2015	Arch Craniofac Surg (Archives of Craniofacial Surgery)	Surgical treatment of polyotia	case report	1	MatriDerm®	none	one-step	The article reports on a rare auricular malformation called polyotia, which is characterized by a large accessory ear. The surgical correction of polyotia in a 3-year-old girl is presented, along with a review of the relevant literature. The corrective surgery involved two stages, with the first stage addressing the redundant skin, and the second stage using cartilage and MatriDerm® to fill in the hollowness and reconstruct the neo-tragus. This led to a succesful clinical outcome.
Truffandier MV., Duteille F.	2015	Ann Chir Plast Esthet	Interest of dermal substitute (MatriDerm®) to cover long fingers after congenital syndactyly: About 20 commissures [article in French] (very similar to data published by Duteille 2015 in Journal of Hand Surgery)	case series	11	MatriDerm®	none	one-step	A retrospective study was conducted on the surgical treatment of congenital syndactylies using MatriDerm® as a dermal substitute for lateral skin defects coverage. 20 commissures (11 children) were included and surgical time averaged 44.6 mins. The OSAS score for patients was 11.9, and there were no complications on the donor site. The study suggests that MatriDerm® is a serious alternative to the gold standard technique of full-thickness skin graft for treating these skin defects.
Meyer W.	2010	Plast Recons Surgery	Laminar implantation of a collagen-elastin matrix improves infraorbital contour in aesthetic facial surgery	prospective case series	29	MatriDerm® (2mm)		subdermally	64% showed good to excellent aesthetic results. 76% of patients reported good to excellent results. Dermal architecture (histology) showed no cellular inflammatory or foreign body reaction at 6 months.
Ryssel H.	2010	Burns	MatriDerm® in-depth adjusted reconstruction of necrotizing fasciitis defects	case series	5	MatriDerm® + STSG		one-step	MatriDerm® was used in patients with necrotizing fasciitis where normally a flap was indicated, but could not be realized due to patient refusal or insufficient vascular preconditions. Take rate: 95%. Clinical course of 1 patient. with pictures described of necrotizing fasciitis of lower extremity. Incl. exposed tendons. Full weight bearing 12 days post-op.
Selig H.	2013	International Journal of Surgery Case Reports	The surgical treatment of rhinophyma. Complete excision and single-step reconstruction by use of a collagen-elastin matrix and an autologous non-meshed split-thickness skin graft	case series	5	MatriDerm® + STSG		one-step	The article describes a case report of a novel surgical approach for treating rhinophyma, which involves deep excision, followed by the application of MatriDerm® and non-meshed split-thickness skin grafting. The use of this approach reduced the risk of recurrence and provided satisfactory functional and aesthetic outcomes. The study recruited five male patients and demonstrated no postoperative complications or hypertrophic scarring or recurrence within the six-month follow-up period. Time to complete healing: 2 weeks. All patients were satisfied with the results, and no surgical revisions were required.
Abed S.	2014	Annales de Dermatologie et de venereologie	The place of skin substitutes in surgical treatment of necrotizing cellulitis: Seven cases [French]	case series	7	MatriDerm® + STSG (1 patient) and Integra® (6 patients)		one-step (Integra® 2 step)	Excellent elasticity and flexibility. Good recovery and functionality. No need for second time general anesthetic with MatriDerm®. Example of clinical case with MatriDerm® and exposed tendon.

Miscellaneous

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes / Summary
Park	2016	Arch Craniofac Surg	Immediate Near-Total Scalp Reconstruction with Artificial Dermis on Exposed Calvarium	case report	1	MatriDerm® and meshed STSG		one-step	In a 78-year-old woman, successfull perfomance of a single-stage reconstruction of a large scalp defect using a combination of MatriDerm®, split-thickness skin graft following wide excision of a cutaneous angiosarcoma. No wound infection or other complications reported up to 13 month postoperatively.
Schmidt	2017 a	Journal of Tissue Engineering and Regenerative Madicine	Hemodynamically stimulated and in vivo generated axially vascularized soft tissue free flaps for closure of complex defects: Evaluation in a small animal model	Animal Study/ prospektiv	35 female Sprague Dawley rats	group 2: AV loop flap produced by the use of MatriDerm® (2mm) + split thickness skin graft	group3: MatriDerm® (2mm) + split thickness skin graft group 1: split thickness skin graft	one-step	The article reports on a study that evaluated the use of AV-loop-generated flaps for the reconstruction of critical bone-exposing defects using a rat model. The study found that the AV-loop-generated flaps resulted in stable wound coverage with homogeneous vascular integration compared to the control groups. Neoangiogenesis was evident in all constructs, and significant increases in mean vessel number and mean vessel area were observed over time. Cell migration and proliferation into the matrix were also observed, with a significant increase over time. The AV-loop-generated flaps resulted in sufficient defect reconstruction and stable tissue coverage compared to the control groups. MatriDerm® efficiently promotes neovascularization and is suitable for tissue engineering of vascularized soft tissue flaps.
Wollina U.	2017 a	Maced J Med Sci	Very Rare Amelanotic Lentigo Maligna Melanoma with Skull Roof Invasion	case report	1	MatriDerm® + meshed skin graft		one-step	In a 73-year-old male patient LMM was removed by slow Mohs. 1 year later, another skin coloured nodule of the bald head was removed by slow mohs surgery. The defect was closed by sandwich transplantation with MatriDerm® and meshed skin graft. Healing was uneventful. Again 1 year later, a firm tumour proliferation around the skin transplant occures (LMM). Wide excision of the tumor. Defect was again closed by sandwich transplantation.
Niedermueller	2018	Unfallchirug	Necrotizing fasciitis of the hand and forearm. Acute surgical treatment and defect reconstruction with MatriDerm® and STSG	case report	1	MatriDerm® + STSG MatriDerm® wrapped around tendon		one-step	Apart from one area above the tendon graft, the soft tissues healed within 2 weeks after covering. Only after removal of the avital graft – 8 weeks after reconstruction – the skin closes completely. Approximately 4 months after reconstruction, the patient already has sensitive areas on half of the skin graft, the pincer grip is weakly possible, the skin sufficiently elastic for wrist and finger movements and cosmetically appealing. The patient achieves a DASH score of 50.8.
Jeong Hyun Ha	2019	Head and neck	Tracheostomy scar management by repositioning platysma muscle and applying an acellular dermal substitute	prospective case series	n = 17	MatriDerm®		one-step	The use of platysma muscle repositioning and an acellular dermal substitute to manage tracheostomy scars in 17 patients was found to be a simple and efficient technique, which improved the appearance and function of the scar. In addition to the mean total Vancouver Scar Scale score improving from 8.265 to 2.324 ($p < 0.0001$), the mean pigmentation score improved from 1.412 ± 0.690 to 0.324 ± 0.431 after surgery ($P < 0.0001$). The vascularity score also improved from 1.706 ± 1.091 to 0.500 ± 0.395 ($P = 0.001$). The pliability score improved from 5.000 ± 0 to 0.706 ± 0.254 ($P < 0.0001$), and the mean height (depression) score improved from 1.47 ± 0.294 to 0.765 ± 0.359 ($P < 0.0001$). The follow-up period was 33.3 (range, 12v-60) months, indicating the long-term effectiveness of the technique.
Riehle	2020	Der Unfallchirurg	Therapie einer nekrotisierenden Weichgewebeinfektion [article in German]	case report	1	MatriDerm®		one-step	A 60-year-old man presented at the emergency department with fever and persistent cough. He had a joint infection and abscess formation in his left lower leg, leading to sepsis. Surgical intervention was necessary, and MatriDerm® was used to cover a resulting wound. He regained normal physical activity within a year.
You	2020	Journal of cosmetic Dermatology	The use of MatriDerm® and skin graft for reconstruction of complex wounds	case control study	15	MatriDerm® + FTSG (n = 5)	FTSG (N = 10)	one-step	The study evaluated the outcomes of combining Matriderm® with full-thickness skin grafts (FTSG) for nasal skin defect closure in five patients. The use of Matriderm® resulted in statistically superior scar quality (8.0 ± 1.9) and higher patient satisfaction compared to conventional FTSG. One-stage Matriderm®-aided FTSGs were well-taken in all cases, and the overall survival rate of the FTSG was 80% in both groups. Matriderm® also provided superior graft shine and alleviated nasal shape distortion. The study concludes that Matriderm® in combination with FTSG is a reliable method for covering nasal skin defects.
Namgoong	2020	Plastic and Reconstructive Surgery	Potential of Tissue-Engineered and Artificial Dermis Grafts for Fingertip Reconstruction	Observational Cohort Study	182	Tissue-engineered dermis grafts, MatriDerm®, Reverse digital artery island flaps	Not specified	No STSG	The study suggests that MatriDerm® may be a promising alternative for managing fingertip defects and lead to lowering the costs. It can induce fine granulation, and complete epithelialization can be achieved without secondary skin grafting.
Coulie	2021	JPRAS Open	The use of MatriDerm® as a single salvage procedure to cover exposed dura mater	case report	1	MatriDerm® (1mm) + STSG	none	one-step	Case report of a 79-year old women with a large cranial defect and exposed dura mater after free flap failure. One stage application of MatriDerm® and STSG with a VAC dressing resulted in stable calvarian reconstruction at 3 months.

Miscellaneous

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Sanz del Pozo (Monclus)	2021	European Journal of Plastic Surgery	The use of Matriderm® for penile reconstruction: a case series	case series	4	MatriDerm® (1mm) + STSG			Four patients with penile wounds were treated using MatriDerm®. The mechanism of injury varied, including subcutaneous penile paraffin injection, electrical burn, and surgical complication. The use of MatriDerm® resulted in a good functional and aesthetic outcome, with no cases of total or partial loss reported. The study highlights the importance of using dermal matrices in penile wounds and recommends multidisciplinary collaboration for better management and results.
Dhannoon	2022	JPRAS Open	Acellular dermal substitute use in reconstruction of axillary hydradenitis suppurativa	case report	1	MatriDerm® (1mm)	none	one-step	A 33-year-old female with refractory HS was reconstructed with Matriderm® and an immediate split-thickness skin graft. The patient demonstrated no restriction in shoulder movement and reported improved pain, self-esteem, and overall quality of life. Matriderm® may be a durable and effective alternative for HS reconstruction.
Lee	2023	Annals of Plastic Surgery	Management of Hardware-Exposed soft Tissue Defects Using Dermal Substitutes and Negative Pressure Wound Therapy	retrospective case series	14	MatriDerm®		one-step	14 patients with hardware-exposing wounds after internal fixation using plates were treated with the wound management procedure, involving surgical debridement, MatriDerm® placement, and negative pressure wound therapy (NPWT). The duration of treatment and number of NPWT replacements were stratified based on injury type, with open fractures requiring significantly longer NPWT and undergoing more replacements. Patients with open fractures underwent a mean of 6.6 NPWT changes while those with closed fractures underwent 2.5 (P = 0.002). However, skin grafting with MatriDerm® was successful in all 14 patients. The study reveals that NPWT and MatriDerm®-augmented skin grafting are useful for hardware-exposed wounds, where flap surgery has been considered the only treatment.

Mucosa

First Author	Year	Journal	Title	Study Type	Number of patients	Treatment group	Control group	One-Step procedure?	Main Outcomes/Summary
Pauchot	2016	Annales de chirurgie plastique esthétique	Conformation du lambeau antébrachial en arche sur mesure pour la reconstruction du voile du palais. Cas clinique	case report	1			one-step	MatriDerm® is used to cover the doner site (60-year-old male) of a "double-arched" flap design for reconstructing soft palate defects after oncologic resection.
Cella	2018	Chirurgia	Surgical oral defects: proposal for a new solution	case serie	40	MatriDerm®			A clinical study on the use of MatriDerm® in oral surgery showed that all 40 patients treated had complete restitution as integrum, with no bleeding phenomena and a shorter healing time compared to traditional surgery. The study suggests that MatriDerm® can be a good approach to reducing healing time, improving final results, and avoiding the risk of recurrences in oral surgery.
Alonso	2019	International Journal of Pediatric Otorhinolaryngology	Three-layered repair with a collagen membrane and a mucosal rotational flap reinforced with fibrine for palatal fistula closure in children	case report	1	MatriDerm®			Three layered repair, with a MatriDerm® placed over the reconstructed nasal mucosa, and a rotational palatal mucosa flap reinforced with a fibrine sealant. The method is simple, easy to reproduce, effective and has a low rate of complications. The multidisciplinary treatment of the child with a cleft lip and palate should include the repair of the birth defect (lip, palate, and nose), achieving normal speech, language, hearing, functional occlusion, and good dental health.
Singh	2023	J Cleft Lip Palate Craniofac Anomal	Dermal substitute reinforced single-layer closure of the palatal fistula	case report	1			two-step	A 3.5-year-old boy presented with anterior palatal fistula. The presence of peri-fistulous scarring prevented two-layered closure. Nasal layer closure was achieved but not the oral layer. The dermal matrix was reinforced in a one-step procedure over the nasal layer and fixed in place using a gel foam. At 6 months, the fistula almost completely healed, with only a pinpoint track remaining that occasionally leaked into the nasal cavity.

MatriDerm®
Flex Dermal Matrix

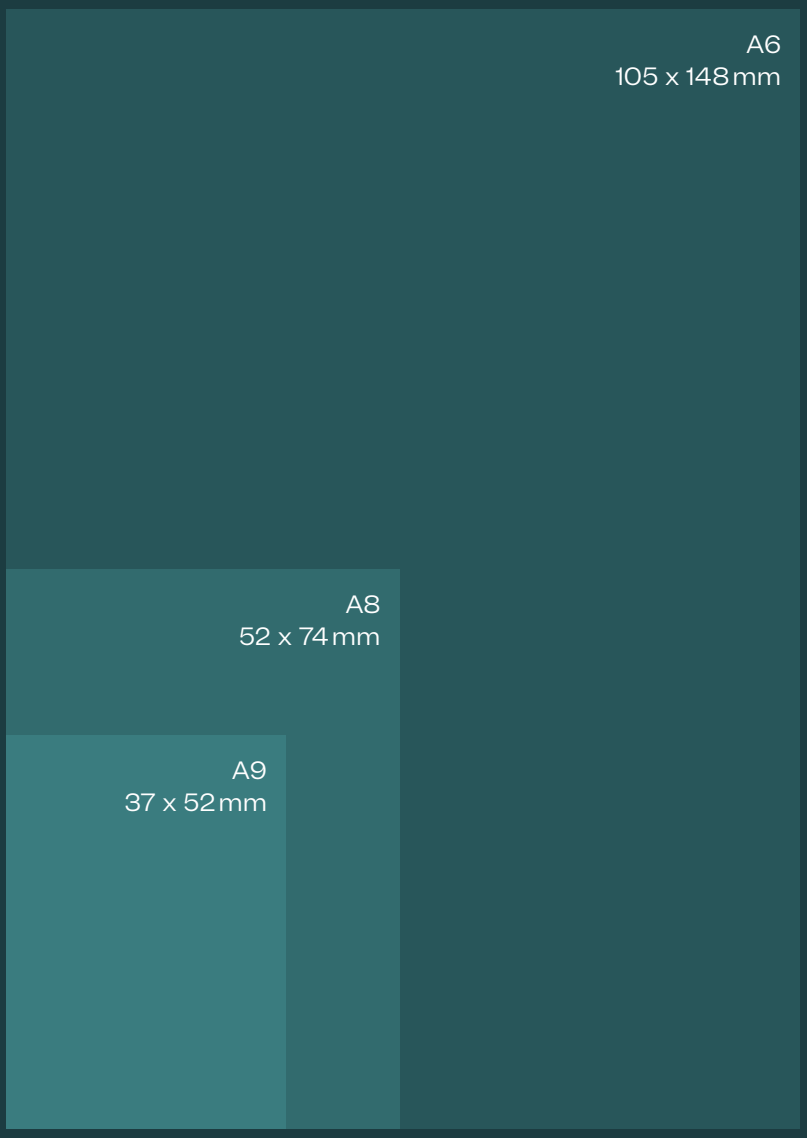
	Ref. No.	Size
A4	83440 – 200	210 x 297 x 1mm
	83460 – 200	210 x 297 x 2mm
	83470 – 200	210 x 297 x 3mm
A6	83441 – 200	105 x 148 x 1mm
	83461 – 200	105 x 148 x 2mm
	83471 – 200	105 x 148 x 3mm
A8	83442 – 200	52 x 74 x 1mm
	83462 – 200	52 x 74 x 2mm
	83472 – 200	52 x 74 x 3mm
A9	83443 – 200	37 x 52 x 1mm
	83463 – 200	37 x 52 x 2mm
	83473 – 200	37 x 52 x 3mm

MatriDerm®Fenestrated
Dermal Matrix

	Ref. No.	Size
A4	83410 – 200	210 x 297 x 1mm
	83420 – 200	210 x 297 x 2mm
	83430 – 200	210 x 297 x 3mm
A6	83411 – 200	105 x 148 x 1mm
	83421 – 200	105 x 148 x 2mm
	83431 – 200	105 x 148 x 3mm
A8	83412 – 200	52 x 74 x 1mm
	83422 – 200	52 x 74 x 2mm
	83432 – 200	52 x 74 x 3mm
A9	83413 – 200	37 x 52 x 1mm
	83423 – 200	37 x 52 x 2mm
	83433 – 200	37 x 52 x 3mm

MatriDerm®Dermal Matrix

	Ref. No.	Size
A4	83500 – 200	210 x 297 x 1mm
	83400 – 200	210 x 297 x 2mm
A6	83403 – 200	105 x 148 x 1mm
	83401 – 200	105 x 148 x 2mm
A8	83404 – 200	52 x 74 x 1mm
A9	83405 – 200	37 x 52 x 1mm



Please check complete indications and recommended application in your local Instructions for Use (IFU) before using MatriDerm®Dermal Matrix.

medskin solutions
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