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TissueMend
Soft Tissue Repair Matrix
For Biologically Inspired
Augmentation of Tendon Healing

Technical Q&A

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Summary:

1. TissueMend Soft Tissue Repair Matrix is an acellular, collagen membrane designed to reinforce tendon repair and facilitate tissue remodeling.
2. A clinical safety record of 99.9% was demonstrated with over 8,500 implantations[7].
3. A unique collagen composition and structure makes TissueMend an excellent biologically inspired scaffold for tissue remodeling.
4. Strength and ease of handling are designed to address the surgical demands of tendon repair.

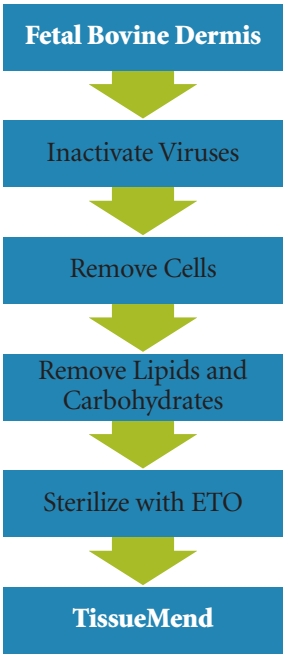
What is TissueMend?

The TissueMend Soft Tissue Repair Matrix is an acellular, collagen membrane designed to reinforce soft tissues where weakness exists. It also serves as a biologically inspired scaffold for cellular and vascular ingrowth that is gradually remodeled into new tissue.[6]

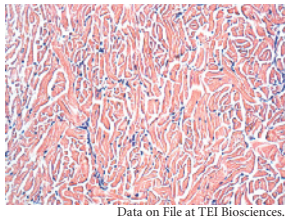
TissueMend is FDA approved for repair and augment of soft tissues during any tendon repair surgery, including the rotator cuff, patellar, Achilles, biceps, quadriceps, and any other tendon.

How is TissueMend produced?

TissueMend is made from fetal bovine dermis through a proprietary manufacturing process. The validated process inactivates any potentially contaminating viruses and terminally sterilizes the final product. Furthermore, all cells and cellular components (e.g., lipids and carbohydrates) that are potential immunogens[2] are removed. The results of separate studies and testing indicated that the reported residual DNA[3] did not cause an immune response.[4, 5]



Stepwise production process of TissueMend.



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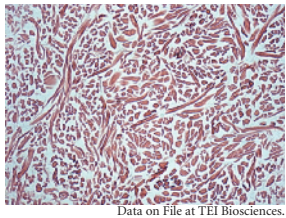
Pre-processed: cells (in blue) are embedded within collagen fibers (in red).



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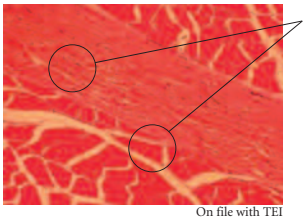
Post-processed: only native collagen fibers are present (in red).

How safe is TissueMend?

TissueMend implants have been demonstrated to cause no inflammation and foreign body reactions in animals.[6, 7] Clinically, TissueMend demonstrated a safety rate of 99.9% with over 8,500 implantations.[7]

Terminally sterilized by ethylene oxide (ETO), TissueMend meets the 10-6 Sterility Assurance Level as recommended by FDA.

Products sterilized by ETO have not exhibited any obvious cytotoxic effects or adverse tissue reaction once implanted.[8, 9] Among the common sterilization methods, ETO is the only one that does not alter the degradation rate of the product,[8] maintaining the product's natural remodeling property.



On file with TEI

Three month intramuscular implantation.

Host cells migrated into the TissueMend. No inflammation and foreign body reaction was observed. On file with TEI.

Why is TissueMend an excellent biologically inspired matrix for tissue remodeling?

Unique Collagen Composition

TissueMend is the only biologically inspired mesh on the market made from a fetal tissue, which exhibited regenerative capacities in fetal wound healing.[10] Degradation products from fetal tissue also help to promote higher cell infiltration than those of adult tissue, facilitating constructive remodeling.[11]

Composed primarily of type I collagen, TissueMend also consists of more than three times of type III collagen than other augmentation products on the market.

Product	Tissue Source	Type III Collagen Content
TissueMend	Fetal dermis	30 %[12]
GraftJacket ZCR Patch	Adult dermis	10 %[12, 13]
Restore CuffPatch	Small intestinal submucosa	< 1 %[14]
OrthADAPT	Pericardium	< 1 %[15]

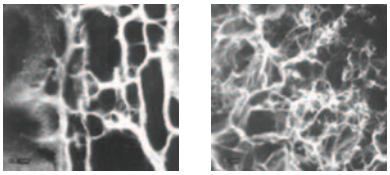
Since Type III collagen is a major component during embryonic tendon development[16] and tendon healing[17] and it is essential for normal formation of type I collagen fibers[18-20], the abundance of type III collagen can be of great advantage during the tissue remodeling process.[21]

Native Collagen Structure

The native collagen structure preserved during the patented production process provides a scaffold that is designed to mimic the body's natural tissue development and healing process.

TissueMend is not artificially cross-linked. Artificial cross-linking may occur as a result of tissue processing or gamma irradiation. Cross-linking may reduce pore size, alter collagen fiber structure, and impede cell infiltration into the scaffold.[1, 22] It also slows down collagen degradation,[1] an imperative step for tissue remodeling.

TissueMend contains the least amount of naturally occurring cross-linked collagen because of its fetal origin,[2,3] potentially allowing for rapid remodeling and tissue regeneration.



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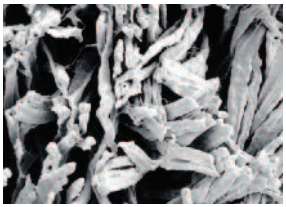
Confocal micrographs showing the surface structure of untreated (left) and cross-linked (right) collagen sponges.[1] Crosslinking reduced pore size and collagen fiber diameter.



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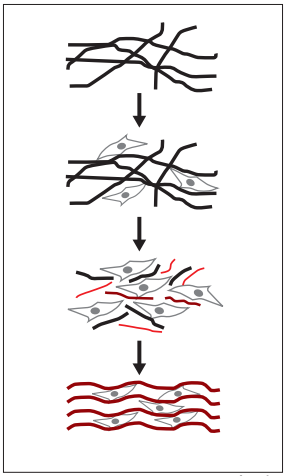
Scanning Electron Micrograph (SEM) of TissueMend scaffold showing the native collagen fiber structure.

Unique Collagen Composition and Structure for Better Tissue Remodeling



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A schematic diagram depicting the scaffold remodeling process:

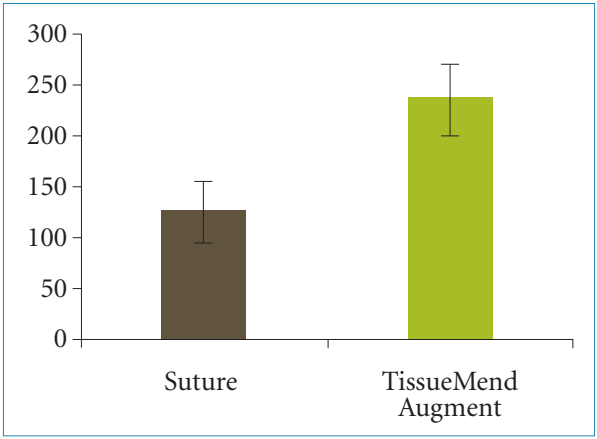
Step 1: Infiltration of host cells after implantation, which is promoted by the natural scaffold structure and composition of TissueMend.

Step 2: Breakdown of the implant matrix and synthesis of the new matrix proteins (e.g. type III and I collagens) by host cells, which is facilitated by the high collagen III content of TissueMend.

Step 3: Formation of host derived matrix mimicking the repair tissue, which is expedited by the non-artificially cross-linked TissueMend.

Is TissueMend strong enough for tendon augmentation?

As a tendon augmentation device, TissueMend increases the time zero failure load by 107% when compared to suture alone,[24] which places it among the strongest soft tissue patches on the market.[25] It has a suture pull-out strength of 35.5 N,[7] helping to satisfy the surgical demands for tendon repair.



Repairs of Achilles tendon rupture were performed on six matched pairs of sheep with either interlocking Krackow loops alone using #2 Ethibond suture or TissueMend circumferentially wrapped around the sutured tendon[24]

What are the other beneficial features of TissueMend?

TissueMend exhibits great handling properties that may enhance efficiency in the operating room. It does not require refrigeration and may be stored at room temperature for up to 3 years. It hydrates in less than 1 minute. Once hydrated, TissueMend becomes conforming, allowing for both open and arthroscopic applications.

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