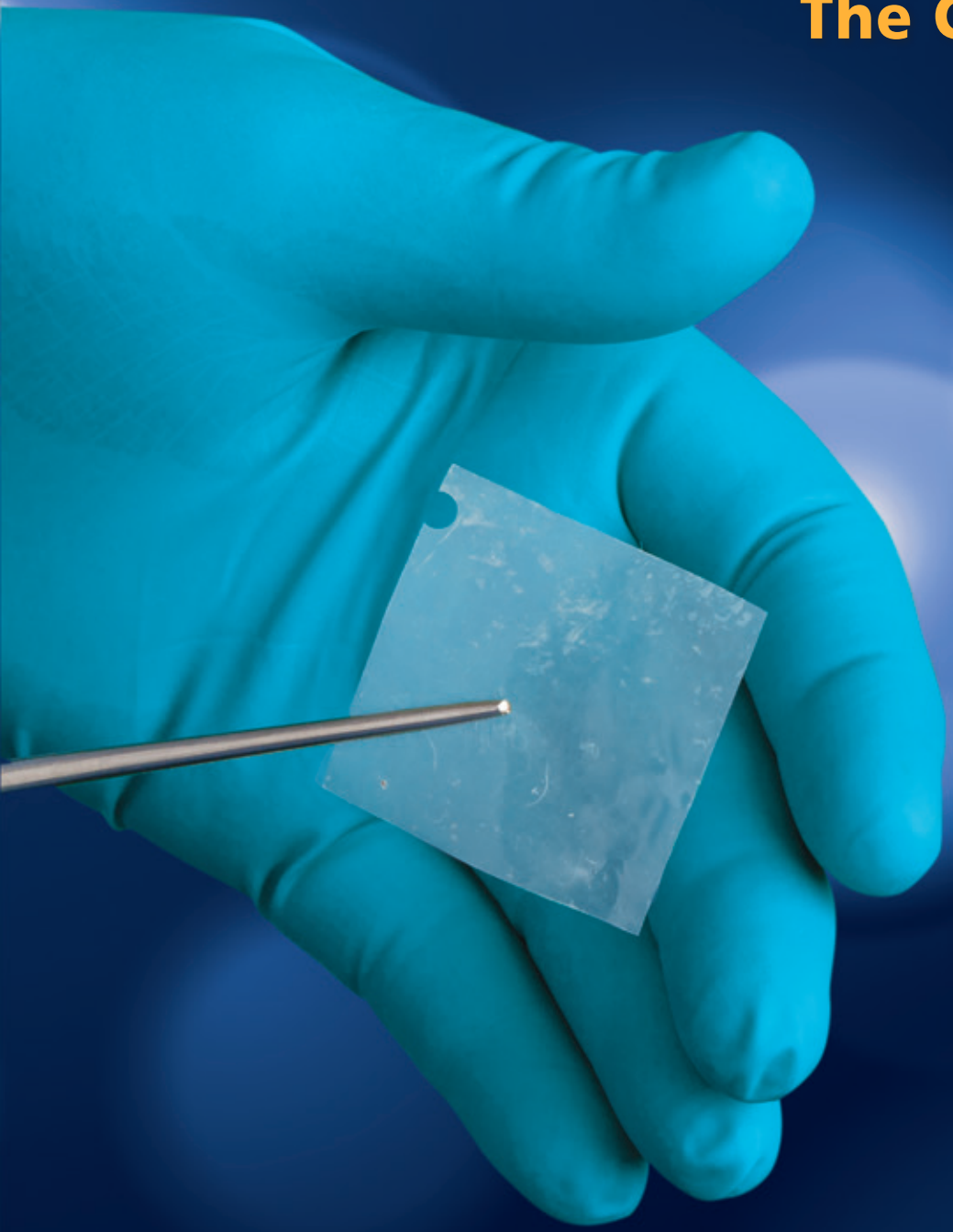
VERSA SHIELD™
AMNIOTIC MEMBRANE

Versatility, The Clear Standard

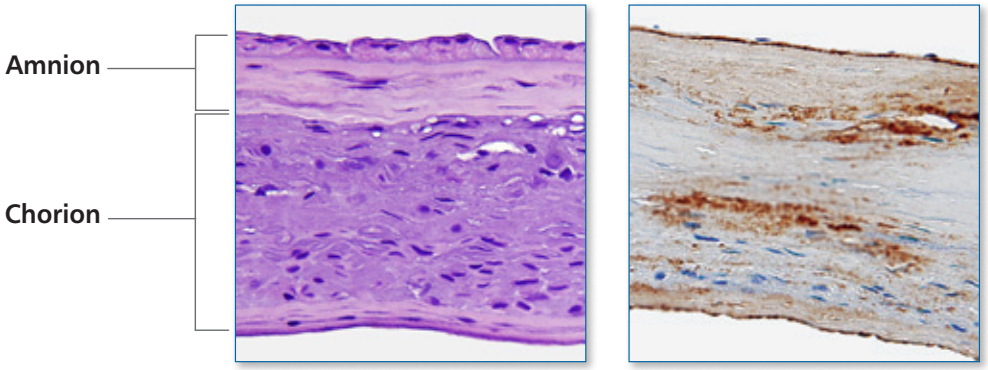


ORTHOFIX®

VERSA SHIELD™
AMNIOTIC MEMBRANE

VersaShield™ Amniotic Membrane

VershaShield is a thin hydrophilic amniotic membrane designed to serve as a wound covering and protective barrier for a variety of surgical demands. VersaShield is derived from the human placental layers amnion and chorion. Due to its flexible properties, these membranes are able to conform to the surgical site.



Histology images show that collagen III stains positively in primarily the amnion areas and some in the chorion. (The stain for collagen III appears as a brownish hue).

A number of biologic membranes are naturally found in the body. Among other functions, these membranes primarily serve to cover, protect and lubricate surrounding tissues and are critical to normal tissue function. Several examples of these coverings include:

- **Fascia** - muscle
- **Epineurium** - nerve
- **Epidermis** - skin
- **Periosteum** - bone
- **Gingiva** - oral tissues
- **Peritenon** - tendons

Disease, injury, or surgical intervention may cause these structures to become damaged or rendered ineffective. The biological consequences of lacking an appropriate protective barrier include increased susceptibility for further degradation or slower healing of underlying tissues as well as the loss of physical separation between adjacent tissues. For example, adhesions have a tendency to form between neighboring tissues following surgical intervention when the surrounding tissue membranes are disrupted. Such post-operative adhesions may result in scarring, reduced motion or pain and potentially longer recovery from injury.[1]

VersaShield Process

VersaShield is isolated from donor placentas and then minimally processed in order to clean and disinfect the tissue. The disinfection process is designed to maintain the structural properties, the composition of the extracellular matrix, and to preserve the inherent biologic activity of the graft material. The resulting dehydrated allograft serves as a protective covering for internal or external wounds including use as covering for the surgical site.

VersaShield does not undergo terminal sterilization techniques as it has been well documented that terminal sterilization may have adverse effects that can reduce efficacy.[2-5] The tissue passes USP <71> Sterility Tests.

Composition of Amnion and Chorion

Placental tissues, such as amnion and chorion, act as a natural barrier between a mother and fetus. The role of these tissues is to prevent rejection of the fetus by the mother and prevents internal adhesions and scarring to the mother.[6, 7] Amniotic tissues are comprised of a single layer of epithelial cells, a thick basement membrane, and a non-vascular stromal layer.

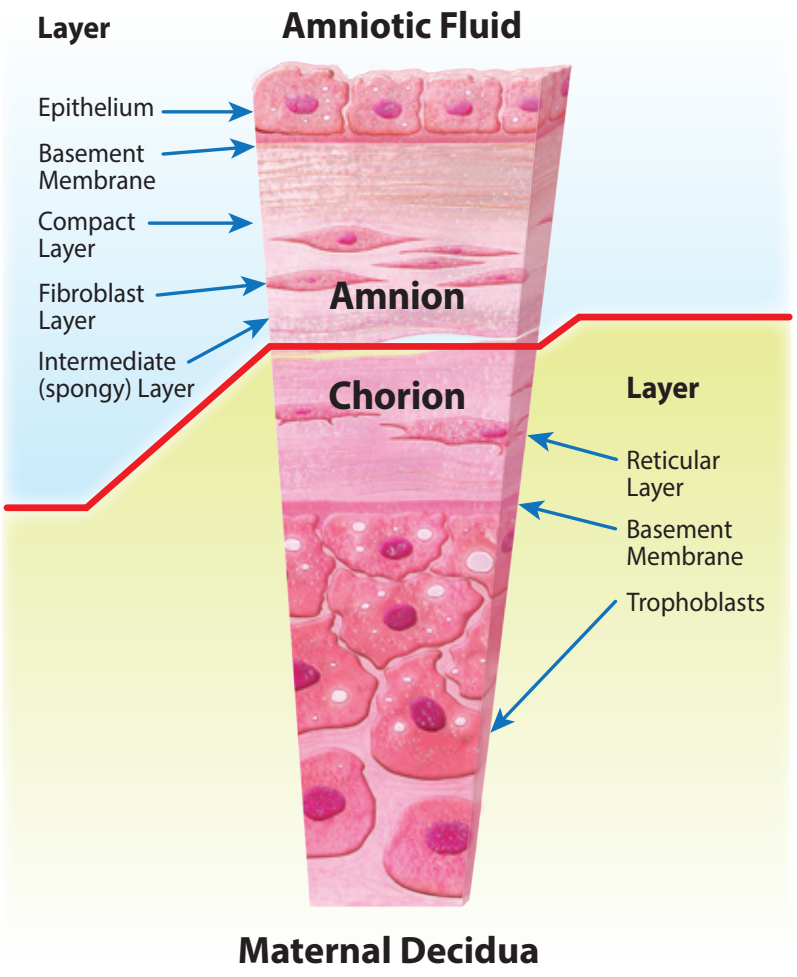
Key matrix components found in amniotic tissue, such as collagen III, fibronectin, and laminin all support the healing process, which makes VersaShield an ideal membrane substitute for clinical needs.

Extracellular Matrix Proteins:

- Collagen I, III, IV
- Laminin
- Fibronectin
- Proteoglycans

Growth Factors:

- TGFß-1, EGF, FGF (Wound healing)
- PDGF, VEGF, (Angiogenic)
- Interleukins (Anti-Inflammatory)
- ß-defensin (Anti-microbial)



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Amnion in Clinical Use

Amniotic tissues have been used in surgical applications for an array of regenerative needs since the early 1900's.[7-11] Their success as membrane allografts has been well documented in numerous clinical applications as both biological dressings as well as a protective coverings:

- General Surgery[12, 13]
- Corneal[14-16]
- Plastic Surgery[17]
- Burn and Wound Care[18-24]
- Sports[25-27]
- Foot and Ankle Procedures[28, 29]
- Spine and Dura repair[30-37]

Due to their long history, amniotic tissues have been well characterized in literature. Amnion has been shown to have the following biological properties.

Non-immunogenic

- Cells do not express HLA-A and –B class I MHC antigens; instead they express HLA-G which is associated with immune tolerance[38, 39]

Anti-adhesive/Anti-scarring

- Down-regulates TGFß-1 and its receptor expression by fibroblasts which can lead to a reduction in the risk of fibrosis[7]
- Modulates the healing of a wound by promoting tissue reconstruction rather than promoting scar tissue formation[40-42]
- Contains IL-6 and IL-10 which are essential in wound healing and reduction of scar formation[43, 44]

Anti-inflammatory

- Limits expression of inflammatory cytokines[45]
- Inhibits MMPs produced by macrophages and inflammatory cells[46, 47]
- Contains large quantities of hyaluronic acid that can entrap inflammatory cells by surface molecule binding[48]

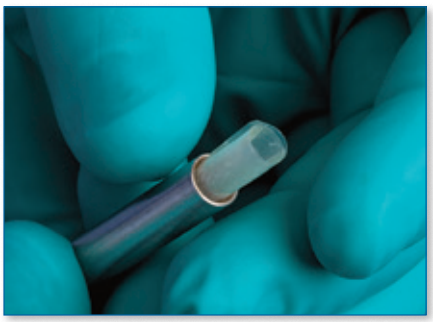
Anti-microbial

- Adheres closely to wounds, helping to prevent bacterial penetration[49]
- Is impermeable to a number of bacterial strains[50]
- Contains anti-microbial peptides including ß-defensins[51, 52]

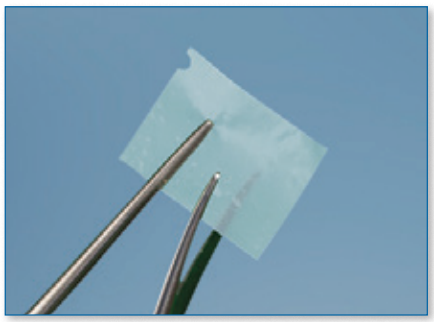
Clinical Features

VersaShield™ has excellent handling properties: its flexible, easy to use, and can be sized intra-operatively.

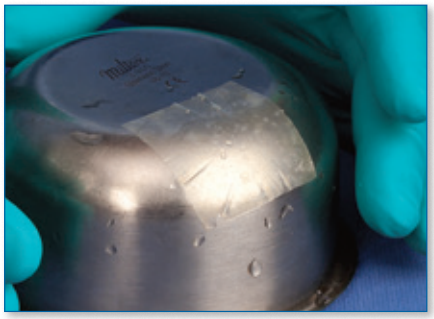
Flexible, Easy to Handle



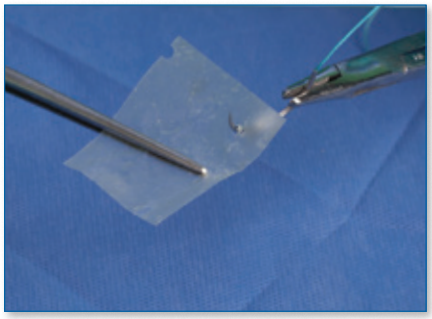
Usable in MIS applications



When dry, can be easily trimmed



When hydrated, conforms to tissue surface



Capable of suture pull through for tacking

When hydrated, has elastic properties

Implantation & Orientation

Notch in upper left hand corner indicates amnion side is facing up.

VersaShield has been characterized for the presence of a number of key growth factors that make it an ideal wound covering & protective barrier. The presence of these growth factors have been identified in VersaShield and previously reported to be linked to key physiologic functions. The presence of these molecules demonstrates that VersaShield is a suitable graft when a biologically-active wound covering or protective barrier is clinically needed.

Presence of Growth Factors in VersaShield*

Native Function	Growth Factors	Presence
Anti-Inflammatory[43-48]	IL-6	✓
	IL-10	✓
Anti-Microbial[49-52]	ß-defensin	✓
Wound Healing[53-57]	TGFß-1	✓
	PDGF-AA	✓
	PDGF-BB	✓
	EGF	✓
	FGF-2	✓

*Data on file at MTF

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The Orthofix MTF Partnership

Orthofix strives to offer the latest advancements in allograft technologies. Through our partnership with MTF, we are able to provide innovative biologics that are safe and efficacious for recipients.

About MTF

The Musculoskeletal Transplant Foundation (MTF) is a non-profit service organization dedicated to providing clinically sound, safe allograft tissue. MTF is comprised of a national consortium of academic medical institutions, organ procurement organizations, and tissue recovery organizations.

Better Standards

- Governed by Surgeons
- Exceeds FDA, AATB & Industry Standards

Better Donors

- Access to more donors than any other tissue bank
- Lead the industry in donor selection criteria

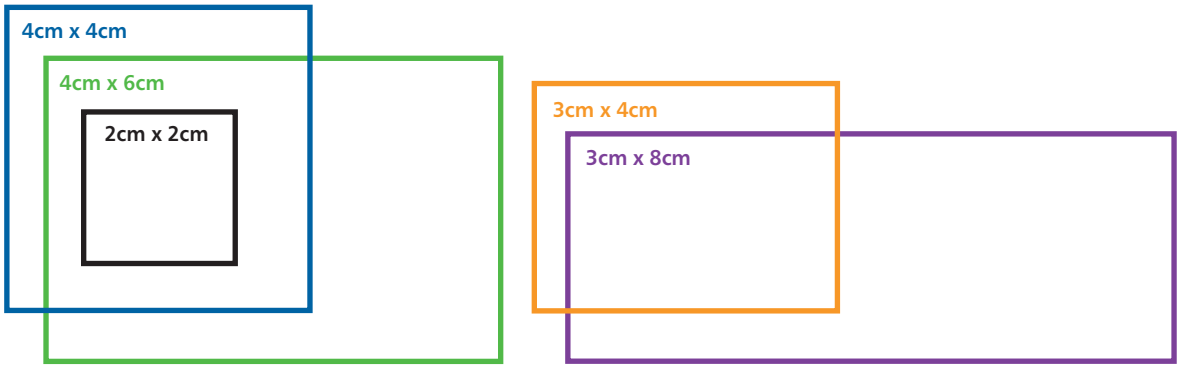
Better Processing

- Processing techniques utilized that protect the natural integrity of the graft
- An exemplary safety record

MTF Musculoskeletal Transplant Foundation
the better approach

Since its inception in 1987, MTF has recovered tissue from over 100,000 donors and distributed more than 5 million grafts for transplantation.

Sizing and Color Code



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