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Amniotic Membrane Explained: What it is and How it is Used in Wound Care

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The human amniotic membrane has been used in wound care for almost a century. It is now enjoying a resurgence in use in wound care, thanks to new techniques that allow this unique material to be dried and stored for prolonged periods of time.

Structure and Function of the Amniotic Membrane

The amniotic membrane surrounds and protects the developing fetus in utero and separates mother and fetus. If you were to look closely at the amniotic membrane, you would be able to notice that the membrane is comprised of several layers. The membrane can be easily separated into two distinct layers: the amnion layer and the chorion layer, which are separated by a jelly-like layer. The amnion layer of the membrane, or fetal side, has a layer of epithelial cells which can easily be removed with simple cell scraping, revealing a see-through underlying layer. The chorion layer is the maternal side of the amniotic membrane. Both layers have a basement membrane and a stromal layer (Medscape, 2012).

If you looked at the amniotic membrane under a microscope, you would be able to appreciate three different types of material: collagen and extracellular matrix, biologically active cells and regenerative molecules. The extracellular matrix provides structure and contains a number of specialized proteins, including proteoglycans, fibronectin, laminins and others. Several types of collagen add structural strength to the membrane. The biologically active cells include stem cells, which function to regenerate new cellular materials within the lining of the membrane. Fibroblasts help to strengthen the tissue, and epithelial cells aid in the healing process via receptors on the cell surface. Regenerative molecules, which are important for growth and healing, are present in the amniotic membrane as well. These include numerous types of growth factors such as fibroblast growth factors, platelet-derived growth factors, metalloproteinases and others. Immunosuppressive cytokines prevent the amniotic membrane from being seen as 'foreign' by both the mother and infant's immune systems. There are also a number of other specialized molecules, such as defensins which protect against bacterial infection (Medscape, 2012).



Wound Healing Properties of Amniotic Membrane

Amniotic membrane has a number of characteristics that make it especially suited to wound healing. The amniotic membrane:

- contains a significant number of cytokines and essential growth factors
- reduces pain when applied to a wound
- increases and enhances the wound healing process
- has antibacterial properties
- is non-immunogenic (will not be seen as foreign material)
- provides a biological barrier
- provides a matrix for migration and proliferation of cells
- reduces inflammation
- reduces scar tissue formation



Dehydration of Amniotic Membrane Tissue

In the past, amniotic tissue was sterilized and stored at 4°C. Amniotic tissue could only be used for up to six weeks, at which point it was no longer useful. Now, this material can be cleansed, dehydrated and sterilized, which means that the shelf life of amniotic membrane has been greatly increased.

Indications for Use

What types of wounds can amniotic membrane be used on? Traditionally, amniotic membrane has been used on burns; nowadays, however, amniotic membrane can be used on a wide variety of wounds. It is important to note that amniotic membrane should be used only after conservative treatment has failed. In other words, amniotic membrane may be used for wounds that are chronic and non-healing.



Application of Amniotic Membrane

Prior to using amniotic membrane, a thorough initial assessment of the wound is necessary, as is a medical history. Gather information on the history of the wound, including duration, what treatments have been tried and patient comorbidity. Document wound appearance, size, depth, presence of necrotic tissue and note whether bone or other structures are visible. Assess circulatory status, nutrition and other barriers to healing. These are the same steps that you would follow prior to implementing any wound treatment and are not specific to amniotic membrane treatment.

Next, prepare the wound bed by performing any necessary debridement. The wound bed should be clear of any necrotic tissue and should not have any signs of infection. Amniotic membrane is supplied in a sterile container, and sterile scissors may be used to cut a piece of the amniotic membrane to fit the wound. The material may be applied wet or dry. Note that the stromal collagen layer must be facing the wound - read the manufacturer's recommendations to determine how to apply the material. You can use steri-strips to hold the graft in place. There is no need to suture the material in place. A secondary dressing which promotes moist wound healing should be chosen as a secondary dressing. The graft should not be disturbed for at least one to two weeks.

After one to two weeks the amniotic membrane allograft will be incorporated into the wound. You should begin to see improvement in the wound in terms of size and depth within 2 to 3 weeks, or even sooner. You can apply a second graft once slowing of wound healing has occurred, as typically observed by wound measurements over time (Podiatry Today, 2015).

The use of amniotic membrane in the management of chronic wounds is an exciting new development which provides another option for wounds that fail to heal using traditional wound therapies and dressings.

Sources:

Fetterolf D, Snyder R. Scientific and Clinical Support for the Use of Dehydrated Amniotic Membrane in Wound Management. Wounds. 2012;24(10):299-307.

Zelen C, Serena T. Amniotic Membrane: Can it facilitate healing? Podiatry Today. 2015 Apr;28(4). Available at http://www.podiatrytoday. com/amniotic-membrane-can-itfacilitate-healing



Sanuwave UltraMIST System Therapy for Evidence-Based, Advanced Wound Care and Pressure Ulcer Treatment Noncontact, Low-Frequency Ultrasound Therapy Has Been Proven to Expedite Healing

UltraMISTTherapyhasbeen clinically demonstrated to promote healing across a wide range of chronic and acute wounds. Unlike most wound therapies that are limited to treating the wound surface, the UltraMIST System delivers low-frequency ultrasound to the treatment site using a noncontact fluid (e.g., saline). MIST Systems produce a low energy ultrasoundgenerated mist to promote wound healing through wound cleansing and maintenance debridement by the removal of fibrin, yellow slough, tissue exudates, and bacteria.

Administered by trained healthcare personnel to thousands of patients for more than a decade and supported by a vast array of clinical evidence, the UltraMIST System's acoustic wave therapy promotes healing by controlling inflammation and reducing bacteria in the wound bed while increasing angiogenesis. Further, to promote healing, it increases perfusion through vasodilation, ultimately increasing oxygen and nutrients to the tissue.



How UltraMIST Works

In action, the UltraMIST System mechanically removes barriers and promotes healing in a wide range of wound types. Indications include, but are not limited to, diabetic foot ulcers, venous leg ulcers, pressure ulcers, and surgical, burn, and deep tissue injuries. It also reduces and removes a wide range of bacteria, including biofilms, while preserving healthy structures





Wound Healing Benefits of UltraMIST Therapy



Reduces a Wide Range of Bacteria Including VRE, MRSA, Acinetobacter, and E. coli1-3

Bacterial biofilm is a structured community of bacteria tightly enclosed within a selfproduced exopolymeric matrix, and its presence is a significant barrier to wound or tissue healing. Since bacterial biofilm is metabolically inactive, it is extremely hard to disrupt with topical/systemic antibiotics, antimicrobials, and/or antiseptics. In a Boston University study, MIST* System treatments every day for six days dramatically reduced density of bacteria entrapped in the biofilm on an established rabbit ear biofilm model infected with

Pseudomonas aeruginosa.4

*Data was compiled utilizing MIST System Therapy. The UltraMIST System is the successor, but maintains the same mechanism of action. For more, see our clinical summary.

Controls Inflammation

Initial injury triggers an inflammatory response within a wound. Controlled inflammation is beneficial, but sustained inflammation can lead to stalled healing.5 Cellular balance is restored by reducing sustained levels of inflammation, allowing wound healing to progress. In a Boston University study, MIST therapy reduced pro-inflammatory cytokines in venous leg ulcers (VLU)6 and nonhealing diabetic foot ulcers.7 The VLU patients experienced a 45% mean reduction in wound size in four weeks compared to no notable improvement with standard of car



Adequate perfusion and vasodilation are required to promote wound and tissue healing. In a Mayo Clinic study5, MIST System treatments improved perfusion to the wound bed that promotes wound healing. Blood flow is especially crucial in deep tissue pressure injuries (DTPI). A retrospective study of DPTIs7 found 80% did not progress beyond stage 2 with the UltraMIST System combined with standard of care (SOC) versus 22% with SOC alone.

AcceleratesAngiogenesisandNeovascularization

New blood vessel formation is an essential component of wound healing as new capillary development and growth are needed to repair damaged tissue. In a 2004 study, MIST therapy accelerated angiogenesis in a diabetic mouse model.8 In another study,9 it was associated with spikes in vascular endothelial growth factor (VEGF) in nonhealing diabetic foot ulcers. The UltraMIST® System treatment group achieved an 86% wound area reduction versus 39% for SOC group.



The CarePICS[®] Virtual Care Platform for PAD, CLI and Wound Care

Our easy-to-use solutions support comprehensive care coordination.

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Report

Provides clinical support staff quick, easy wound imaging and

exceptionally accurate auto measurement capabilities

- Tap Report
- Take picture
- Add coin or green dot for comparison
- Send to colleagues and specialists

Visit

Performs secure video calls between patients and providers to assess

conditions and provide guidance throughout the wound healing process

- Discuss patient history
- Request photos and perform wound measurements
- Review nutrition and exercise
- Provide a safe environment to communicate, especially during the pandemic





Consult

Connects providers to specialists to request and perform virtual consults

- Built for peer-to-peer clinical consults across multi-specialty care teams
- Request virtual consults from specialists to coordinate care
- Send patient data and imagery to receive diagnosis and treatment recommendations
- Receive Medicare and private payor reimbursement for requesting or performing consults

Order

Utilizes smart ordering system to fill custom medical product requests for patients

- Work in convenient, easy-to-use portal
- Speed up third-party supply orders and ensure accuracy and compliance
- Enter clinical information and receive what Medicare will pay for supplies based on wound size
- Auto-send to provider to sign, then goes straight to distributor of choice for shipment
- Generate necessary documentation for the use of advanced wound care products



