

Burns: treatment options

Current severe burn treatments

Delayed healing of severe burns is associated with a hyperinflammatory response that may lead to permanent disfigurement and decreased mobility.¹ Therefore, early assessment and use of advanced treatments designed to minimize recovery time and pain are important factors to achieve the best patient outcome. These advanced treatments can support debridement, prevent moisture loss, prevent infection, and support the closure of the burn. It is important to recognize that burn treatment options and decisions vary in every practice.^{2,3}

When treating a severe burn, two skin functions that have been lost must be supported: prevention of moisture loss and prevention of infection.^{3,6} These functions must be supported from the initial incident until the skin is fully healed and functional.³ While some ointments may qualify as moisture barriers, advanced synthetic dressings are typically the preferred treatment option and should be selected based on the amount of drainage from the wound.³ Due to the risk of local and systemic infection, topical antimicrobials are an essential part of burn care and must be selected to cover a wide spectrum of infectious agents.² It is important to recognize that some infection prevention treatments, such as silver sulfadiazine and mafenide acetate, have shown toxic effects *in vitro* on keratinocytes and fibroblasts that can delay wound healing.⁴ Thus, alternate treatment options containing other compounds, such as silver ion dressings that can address the bacterial loads with limited toxicity, may be preferred.⁴

Debridement, or early excision of the burn eschar and underlying damaged tissue, is a standard treatment for severe burns.² The extent of burn

damage may change for up to 72 hours after injury; however, it is important to identify all devitalized tissue so it does not remain as a barrier to healing or become a possible site of infection. Removing the devitalized tissue allows the underlying and surrounding healthy tissue to be available to support wound closure using advanced treatment options, such as autografts, allografts, and xenografts.⁶

To achieve wound closure, autologous skin grafts remain the “gold standard” for burn treatment because they provide an immediate intact skin replacement.² However, there are many situations in which autologous skin grafts are not ideal due to conditions of the wound, the patient, or the clinical facility. The wound bed may not be adequately vascularized to support engraftment due to exposed bone/tendon, wound infection, or other conditions.^{2,7} The burn may be located in areas with localized tissue properties for function and aesthetics, such as the hands, parts of the face, or load-bearing parts of the foot.² Patients may have limited available harvest sites, especially if they are severely burned.^{2,5} Engraftment of the skin or healing of the donor site wound could also be compromised in patients with underlying conditions. The pain and healing time of the donor site may also be a reason that a skin graft is not acceptable for some patients.⁸ In addition to these patient-specific factors, the treating facility may not have the capability or authorization to perform the skin grafting procedure.

In situations where skin grafts are not feasible or are inappropriate, clinicians can turn to cell and/or tissue-based products (CTPs) as an advanced treatment option to support burn management.² In some cases, xenografts or cadaver skin allografts

Note: OASIS Burn Matrix is the product name in the U.S. OASIS Extracellular Matrix is the product name outside the U.S.

may be used as temporary coverings to provide a protective barrier and prevent moisture loss until the wound bed is healthy enough to support permanent closure.^{2,5} These may partially incorporate into the wound bed, but they are not intended to provide permanent skin replacement.^{2,5}

Other advanced treatments utilize small samples of the patient's skin to isolate skin cells that can either be applied as a spray or gel or be grown into a cellular sheet in a lab to expand the area of application.² The length of time to form the sheet, size limitations, and its resulting fragility, have limited the usefulness of this option.²

The limitations of these options for supporting burn management and closure have led to the development of off-the-shelf CTPs that can support the patient's own wound healing capabilities. Some CTPs are used to develop a healthy wound bed for skin grafting by providing an artificially cross-linked collagen scaffold for the patient's cells to inhabit.^{9,10} These CTPs may be attached to a silicone layer that serves the barrier function otherwise addressed with dressings, but this layer needs to be removed 14-28 days after the initial application.¹⁰ Another type of CTP is an extracellular matrix (ECM) product, which provides the naturally occurring ECM environment taken from animal or human tissue. These ECM products support cell and blood vessel migration into the ECM and are incorporated into the final tissue. ECM products can support wound bed management until the wound is ready for a skin graft, in areas around skin grafts, or all the way to closure when a skin graft is not appropriate.

OASIS Extracellular Matrix

OASIS Extracellular Matrix is a naturally occurring ECM derived from pig small intestinal submucosa (SIS) that is completely decellularized, biocompatible, and sterile. OASIS can be used to support the burn healing process because it:

- Retains the naturally derived ECM architecture of the tissue environment, which supports the rapid influx of the patient's own cells and blood vessels.^{11,12}
- Contains naturally occurring fibronectin, which supports cell binding to the ECM as cells migrate into the scaffold.^{13,14}
- Contains glycosaminoglycans (GAGs), such as hyaluronic acid and heparin, which retain water and allow SIS to support re-epithelialization.^{6,15,16}
- Offers a burn treatment solution without daily dressing changes.¹⁷
- Has demonstrated good clinical outcomes in three burn publications with limited populations, including good aesthetic outcomes, no complications, and no infections.¹⁷⁻¹⁹

Conclusion

The body's response to a burn is complex, and any treatment that intends to replace or enhance the regeneration of tissue must be multifaceted. OASIS is a naturally occurring ECM that can be considered a multifaceted burn therapy because it provides a solution that can manage the wound bed until skin grafts are appropriate and also provides a non-surgical solution for wound closure.

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