Tissue Extracellular Matrix (ECM)

**ECM Key Facts**

- Present in all tissues and functions as the biological scaffold for cells
- Contains structural, adhesion and signaling molecules
- Tissue function and healing are dependent on the ECM
- The ECM is damaged or missing in wounds
- The ECM is not a bystander during healing, but actively directs and provides a scaffold for cells

Every body has the power to heal
TISSUE EXTRACELLULAR MATRIX

The essential tissue network

The extracellular matrix (ECM) is the material found around and between cells binding them together, and is made up mostly of collagen along with other proteins.\(^1,2\)

The ECM provides a structural scaffold to the body’s tissues and organs, such as the skin, and is a critical platform for ongoing, dynamic and reciprocal communication and signaling between cells.\(^1,3\)

ECM is essential to the health of tissues and to the tissue repair process

Epithelial cells

Laminin

Collagen IV

Elastin

Blood vessel

Collagen I and III

GAG’s, hyaluronic acid, heparin sulphate

Fibronectin

Growth factors, chemokines

Fibroblast cells

Dynamic Reciprocity – the interplay between cells and ECM

Tension

Polarity

Differentiation

Migration

Proliferation

Survival

Dynamic Reciprocity

The ECM is not a silent bystander during the healing process.

The ECM and its associated components play key roles in orchestrating communication that directs cells to grow, divide, move and attach.

The interplay between cells and the ECM is termed ‘dynamic reciprocity’ and occurs during all phases of wound healing.\(^5\)
**Composition**

The maintenance of healthy tissue and wound repair require a host of different molecules to guide these complex tissue processes. The ECM is a complex mixture of structural adhesion and signaling molecules that interact with cells during the phases of wound repair and tissue maintenance.\(^3\,4\)

**ECM contains components essential to tissue maintenance and repair**

<table>
<thead>
<tr>
<th>Component</th>
<th>Class</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collagen I</td>
<td>Structural</td>
<td>Provides structure and strength</td>
</tr>
<tr>
<td>Collagen III</td>
<td>Structural</td>
<td>Provides delicate scaffold architecture</td>
</tr>
<tr>
<td>Collagen IV</td>
<td>Adhesion</td>
<td>Anchors epithelial cells to the matrix</td>
</tr>
<tr>
<td>Fibronectin</td>
<td>Adhesion</td>
<td>Enables cell attachment and proliferation during infiltration and remodeling</td>
</tr>
<tr>
<td>Laminin</td>
<td>Adhesion</td>
<td>Interconnects scaffold proteins and guides epithelial migration</td>
</tr>
<tr>
<td>Elastin</td>
<td>Structural</td>
<td>Provides structural integrity and elasticity</td>
</tr>
<tr>
<td>Hyaluronic acid</td>
<td>Structural</td>
<td>Facilitates infiltration via organization of cells and scaffold components</td>
</tr>
<tr>
<td>Heparin sulphate</td>
<td>Adhesion</td>
<td>Multifunctional regulator of remodeling</td>
</tr>
<tr>
<td>GAGs</td>
<td>Structural</td>
<td>Binds water to maintain scaffold hydration</td>
</tr>
<tr>
<td>Growth factors and chemokines</td>
<td>Signaling</td>
<td>Essential communication between cells and between the ECM and cells</td>
</tr>
</tbody>
</table>

**A damaged or missing ECM requires repair**

In acute and chronic wounds, the ECM is missing, structurally damaged or unable to function.\(^3\,4\)

Without functional cues from ECM components, wound healing cannot move forward, and chronicity prevails.\(^4\,6\)
ECMs can provide a scaffold to influence all phases of healing

- Stabilizes the wound bed
- Provides a scaffold for platelet aggregation
- Recruits cells

- Balances wound proteases
- Reduces inflammation

- Provides a porous scaffold for rapid cell infiltration
- Recruits cells
- Stimulates cells

- Promotes constructive remodeling
- Undergoes host-mediated biodegradation

ECM technologies can augment missing or damaged ECM

Technological advances have meant that it is now possible to replace the patient’s missing or damaged ECM with a temporary substitute. These ECM technologies act as a provisional ECM to support and guide cell infiltration of the tissue deficit. During the phases of wound healing these ECM technologies augment the patient’s own tissue ECM. The key considerations for ECM products is the preserved biological accuracy of the ECM scaffold as well the molecular form of its components to maintain functionality.

The paperclip analogy demonstrates how loss of structure results in loss of functionality.
TISSUE EXTRACELLULAR MATRIX

Endoform® is a unique tissue extracellular matrix

Endoform® provides a natural porous scaffold that supports rapid epithelial and fibroblast infiltration. Over time the scaffold is completely remodeled as new tissue is laid down.

Wound model demonstrating cell infiltration and adhesion (light blue) onto the Endoform® scaffold (dark blue) during healing

Images show DAPI (a florescent stain, diamidino phenylindole) stained Endoform® infiltrated with human fibroblasts cells after 0.5, 5 and 10 days. Images at 20x magnification.

Endoform also retains the natural molecular structure of ECM collagen. Preservation of native structure is important in ensuring biological function is not lost.

The composition of Endoform®’s ECM enables it to interact with patients’ cells during the phases of healing.

Endoform® contains 148 secondary molecules, including structural and adhesion proteins, and glycosaminoglycans (GAGs), that are important during healing. Endoform® only contains components that are found in tissue ECM.
## References


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**RX Only.** Prior to use, be sure to read the entire Instructions For Use package insert supplied with the product.

For product questions, sampling needs, or detailed clinical questions concerning our products in the US, please call 1-860-337-7730

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**Appulse**

**Endoform® Dermal Template** is marketed in the USA by Appulse. [www.appulsemed.com](http://www.appulsemed.com)

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