Comparison of Porcine and Amnion Chorion Resorbable Collagen Membranes Using Immunochemistry: Abstract #146797

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Background:
Resorbable biologic membranes have gained in popularity partially due to the possibility of associated proteins in their matrix that may facilitate wound healing.

Purpose:
To test the presence of prominent proteins associated with biological activity and growth factors in a porcine collagen membrane (PCM) and a human placenta-derived amnion-chorion membrane (ACM) through immunohistochemistry (IHC). IHC involves localizing proteins in a tissue section by exploiting the principle of antibodies binding specifically to antigens in biologic tissue.

Material & Methods:
Commercially-sourced dry collagen based samples of ACM n=5 (BioXclude™, Snoasis Medical) and PCM n=5 (BioGide®, Geistlich) were placed in 10% neutral buffered formalin with appropriate non-specific stains. The samples for IHC reacted with primary antibodies to laminin, laminin-5, fibroblast growth factor (FGF), transforming growth factor beta (TGFβ), and platelet-derived growth factors alpha (PDGFα) and beta (PDGFβ) with appropriate negative controls. The samples were scored for positive staining (immunoactivity) using a 6-point scoring system, 0 = no stain to 5 = intense stain.

Results:
The results revealed no IHC staining in PCM for the growth factors tested, with the exception of staining scored as moderate for PDGFβ. ACM samples stained positive with statistical significance for laminin, laminin-5, FGF, and PDGFα. Of noteworthy significance is the moderate-to-intense staining of laminin and laminin-5 in ACM (P<0.0001).
**Summary of Results**

<table>
<thead>
<tr>
<th></th>
<th>Laminin</th>
<th>Laminin-5</th>
<th>TGFβ</th>
<th>FGF</th>
<th>PDGFα</th>
<th>PDGFβ</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACM</td>
<td>4.4 ± 0.55</td>
<td>4.2 ± 0.45</td>
<td>1.4 ± 0.9</td>
<td>0.7 ± 0.45</td>
<td>2.4 ± 0.55</td>
<td>3.2 ± 1.1</td>
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<tr>
<td></td>
<td>p &lt; 0.001</td>
<td>p &lt; 0.001</td>
<td>p &lt; 0.05</td>
<td>p &lt; 0.05</td>
<td>p &lt; 0.005</td>
<td>NS</td>
</tr>
<tr>
<td>PCM</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>3.0 ± 0.0</td>
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**Discussion:**

Laminins are the major class of basement membrane proteins and have multiple biological functions, including cell binding, migration, proliferation and differentiation. Of these, laminin-5 is of particular importance in dental regenerative procedures. Laminin-5 possesses a high affinity for cellular adhesion of gingival epithelial cells and plays a prominent role in the attachment and migration of those cells. The presence of laminin and laminin-5 in ACM should allow for faster wound closure in the event of membrane exposure in dental regenerative procedures by providing a capability not found with currently available porcine and alloplast membranes.

**Summary & Conclusions:**

The results of this study revealed no immunoactivity in the porcine membrane with antibodies to laminin, laminin-5, TGFβ, FGF and PDGFα and moderate staining with PDGFβ. At the same time there was moderate-to-intense immunoactivity of laminin and laminin-5, moderate staining of PDGFβ, minimal-to-moderate staining of PDGFα and minimal-to-weak staining of TGFβ and FGF in ACM. The moderate-to-intense immunoactivity of laminin and laminin-5 in ACM strongly suggests that the membrane provides a protein enriched matrix which should hasten wound healing, a benefit not available with PCM. Future research should be directed toward greater specification of the types and amounts of proteins found in ACM and if indeed the presence of these proteins enhance wound healing capability.

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