The Biomechanical Properties of Rabbit Cornea at Different Corneal cross-linking irradiances.

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INTRODUCTION

- Previous researches investigate the corneal biomechanical properties of CXL use the extensometry technique. But there are some limitations of the extensometry technique.

Extensometry technique
- corneal strip
- tension loads
- elastic modulus

VS

Inflation test
- the whole cornea
- posterior pressure
- tangent modulus

**PURPOSE**

- To investigate the corneal biomechanical properties of CXL using inflation test at different corneal cross-linking irradiances.
- To evaluate whether the Bunsen-Roscoe law can be used in CXL.
- provide the basis for the selection of clinical treatment parameters.
METHODS

- Eighty-four purebred Japanese rabbits were randomly divided into 7 groups.
- Left eyes as treat group, right eyes as normal group.
- Riboflavin 0.22% (vibex xtra, avedro) and uva(370nm) in de-epithelialized cornea at different corneal cross-linking irradiation of equal total energy:

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Grouping scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>3mw</td>
<td>12</td>
<td>3 mW/cm² for 30 minutes</td>
</tr>
<tr>
<td>9mw</td>
<td>12</td>
<td>9 mW/cm² for 10 minutes</td>
</tr>
<tr>
<td>18mw</td>
<td>12</td>
<td>18 mW/cm² for 5 minutes</td>
</tr>
<tr>
<td>30mw</td>
<td>12</td>
<td>30 mW/cm² for 10 minutes</td>
</tr>
<tr>
<td>45mw</td>
<td>12</td>
<td>45 mW/cm² for 2 minutes</td>
</tr>
<tr>
<td>90mw</td>
<td>12</td>
<td>90 mW/cm² for 1 minute</td>
</tr>
<tr>
<td>NUVA</td>
<td>12</td>
<td>Unirradiated</td>
</tr>
</tbody>
</table>

- All eyes were prepared for inflation test 1 week postoperatively.
RESULT

- The relationship between stress and strain:

- The tangent elastic modulus:
CONCLUSION

• The biomechanical properties of rabbit cornea underwent corneal collagen cross-linking decreased with increasing irradiance. 9mw/cm² is probably the most optimal irradiance.

• The Bunsen-Roscoe law can’t be readily used in corneal collagen cross-linking. KXL still needs to be optimized.