Collagen Crosslinking using HPMC versus Dextran Riboflavin Solutions

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Purpose

• Compare clinical outcomes of CXL between HPMC and dextran-based riboflavin solutions in eyes with keratoconus and post-refractive surgery ectasia
Comparing HPMC and Dextran

- Dextran thins the cornea\(^1\,^2\,^5\)
  - Endothelial cell damage
- HPMC speeds diffusion rate of riboflavin\(^4\)
- HPMC is more convenient\(^6\)
  - Ships at 25° Celsius and can be autoclaved
- Conflicting measurements of precorneal film thickness\(^5\)
Methodology

• Standard Dresden protocol

• Dextran-treated group (Sep. 2010-Jan. 2014)
  • 20% dextran solution with 0.1% riboflavin
  • 37 eyes of 33 patients

• HPMC-treated group (Jan. 2014-Aug. 2015)
  • 1.1% HPMC solution with 0.1% riboflavin
  • 19 eyes of 19 patients
Change in BSCVA with HPMC vs. Dextran (negative logMAR)

- Pre-operative
- 1 Month
- 6 Months
- 12 Months

HPMC
Dextran

p<0.001
p<0.05
p<0.05
Change in BSCVA Compared to Fellow Eye
HPMC-treated (negative logMAR)

<table>
<thead>
<tr>
<th>Time</th>
<th>CXL</th>
<th>Control</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Month</td>
<td>n=12</td>
<td>n=14</td>
<td>p=0.1</td>
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<tr>
<td>6 Months</td>
<td>n=14</td>
<td>n=11</td>
<td>p=0.96</td>
</tr>
<tr>
<td>12 Months</td>
<td>n=14</td>
<td>n=11</td>
<td>p=0.69</td>
</tr>
</tbody>
</table>
Change in BSCVA Compared to Fellow Eye
Dextran-treated (negative logMAR)

Negative LogMAR

1 Month       6 Months       12 Months       24 Months

n=26          n=22           n=19            n=10

CXL           Control (Fellow Eye)

p<0.01

p=0.74
Change in Kmax with HPMC vs. Dextran (diopters)

- HPMC
- Dextran

-3
-2
-1
0
1
2
3
4

0 Months
1 Month
6 Months
12 Months

Diopters

p=0.01
p=0.28
p=0.49

Pre-operative

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Change in Kmax Compared to Fellow Eye (diopters)

- CXL HPMC
- Control (Fellow Eye) HPMC
- CXL Dextran
- Control (Fellow Eye) Dextran

1 Month 6 Months 12 Months

Diopters

- CXL HPMC: p=0.08
- Control (Fellow Eye) HPMC: p=0.95
- CXL Dextran: p=0.13
- Control (Fellow Eye) Dextran: p=0.17

n=6 n=16 n=9 n=16 n=9 n=13

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Conclusions and Future Directions

• Dresden protocol shows better visual outcomes using dextran-riboflavin solution compared to an HPMC-riboflavin solution

• Dresden protocol shows greater stability in Kmax at 1 month in dextran compared to HPMC

• HPMC and dextran both stabilized keratoconus

• Apparently these solutions do not have an identical photochemical response

• Larger population and more long-term data needed
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References


