Effects of Anti-inflammatory Nanofibers on Urethral Healing

Yvonne Y. Chan¹, Matthew I. Bury¹, Natalie J. Fuller¹, Bonnie Nolan¹, Emily M. Yura², Matthias D. Hofer², Arun K. Sharma¹,²

¹Ann & Robert H. Lurie Children’s Hospital of Chicago
²Northwestern University
Disclosures

• None
Inflammation Prolongs Urethral Wound Healing

Inflammation → Delayed Urethral Wound Healing → Increased Risk for Complications
Peptide Amphiphiles (PA)

Cui H, Webber MJ, Stupp SI. Biopolymers. 2010
Anti-inflammatory Peptide Amphiphiles (AIF-PA) in bladder regeneration

- Decreased inflammatory markers

![Graph showing inflammatory markers in regenerated tissue](image-url)

Sharma et al. Biomaterials. 2014
Anti-inflammatory Peptide Amphiphiles (AIF-PA) in bladder regeneration

- Increased Vasculature

Sharma et al. Biomaterials. 2014
Aim

- Evaluate the effect of anti-inflammatory nanofibers in urethral wound healing

Hypothesis

- Anti-inflammatory PAs (AIF-PA) will positively modulate post-operative local tissue inflammatory responses and enhance urethral wound healing
Urethroplasty

- SIS Alone (Control)
- SIS + Control PA (Control)
- SIS + AIF-PA (Experimental)
Analysis

• Animals euthanized at 14 and 28 days

• Urethra divided into 3 sections for analysis
  – NATIVE
  – ANASTOMOSIS (A)
  – REGEN (area of tissue regeneration)

• Analyses:
  – H&E staining
  – Trichrome staining (evaluate vasculature)
  – Immunohistochemistry
    • Cytokines-TNFα and IL-1β
    • Immune cell markers- CD68, CD86, CD206, Myeloperoxidase (MPO)
Inflammatory markers at 14D at the Anastomosis

Cytokines
- TNFα
- IL-1β

Immune Cell Markers
- CD68
- CD86
- MPO
- CD206

Percent positive [(positive cells/total cells) * 100]
Inflammatory markers decreased by 28D but the pattern remained in the same
More Complete Urethral Wound Healing in AIF-PA group at 14 days

- Presence of complete urethral healing with tissue regeneration in the REGEN area.

<table>
<thead>
<tr>
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<th>SIS alone</th>
<th>SIS + control PA (control)</th>
<th>SIS + AIF-PA (experimental)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 Day</td>
<td>3/6 (50%)</td>
<td>2/6 (33%)</td>
<td>5/6 (83%)</td>
</tr>
<tr>
<td>28 Day</td>
<td>6/6 (100%)</td>
<td>6/6 (100%)</td>
<td>6/6 (100%)</td>
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Increased Vasculature in the AIF-PA group at 28 Days
Conclusion

• AIF-PA altered the inflammatory cytokine profile in urethral wound healing.

• Further studies are needed to elucidate the specific mechanism of inflammatory response modulation on angiogenesis and overall urethral healing.

• AIF-PA may have future applications in enhancing post-surgical healing in urethral reconstruction.
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