Stromal Derived Factor-1 Penile Injections Improve Erectile Function Preservation following Nerve Crush Injury by Enhancing Stem Cell Recruitment to the Major Pelvic Ganglion

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Post-Prostatectomy Erectile Dysfunction

Surgery results in a temporary neuropraxia resulting in near complete temporary loss of erectile function resulting in decreased penile tissue perfusion.

More seriously injured nerves undergo Wallerian degeneration resulting in loss in penile tissue innervation.

Morphological tissue changes include smooth muscle apoptosis, decreased density of microvasculature, increased collagen/scar remodeling and replacement of erectile tissues seen both in humans and in animals (cavernous nerve crush model).

Aberrant molecular signaling including increased RhoA/ROCK activation, decreased nNOS, increased free radical production, decreased growth factor expression.

**Stromal Derived Factor - 1**

SDF-1 is a small (110 KD), highly conserved chemokine.

Only 1 AA substitution difference between rodents and humans

It is a lethal knock-out

Discovered in the early 1990’s as being important for bone marrow homing and B-cell proliferation

Potent stem cell chemoattractant via binding to CXCR4. Lesser known, recently discovered CXCR7 receptor – possible ‘decoy’ receptor.

Upregulated in many tissues (i.e. heart, brain, muscle) following injury, especially ischemic injury

Inherent pro-angiogenic, anti-apoptotic, and neurotrophic effects

SDF-1 Expression Increased following bilateral cavernous nerve injury (BCNI) and ESWL Treatment in rats

2012 EurUrol Fandel et al.

2015 JSM Li et al.
Goals

Evaluate the effects of penile injection with recombinant human SDF-1 (rhSDF-1) on stem cell pathways in the MPG following bilateral nerve crush injury
Bilateral nerve crush injury (BCNI)

- **MPG**
  - **CAUDAL**
  - **CRANIAL**
- **Pro**
- **Bla**
- **SV**

**Intracavernosal Pressure (ICP)**

- **8 Days**
- **6 Days**
- **Treatment-Free Period**

**Bilateral Nerve Crush Injury (BCNI)**

- **5x QOD**
- **Starting POD 0**
- **50uL saline or**
- **1ug SDF1**
Penile Injections with rhSDF-1 Protein Facilitates Preservation of Erectile Function Following BCNI

BCNI+Saline

BCNI+SDF-1

ICP/MAP

p=0.02

Saline Injection  SDF1 Injection

n = 6/group
rhSDF-1 penile injections increases stem cell activity in the MPG following BCNI
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rhSDF-1 penile injections increases stem cell lineage marker expression in the MPG following BCNI
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Conclusions

rhSDF-1 penile injections immediately following BCNI improves erectile function

rhSDF-1 penile injections increases stem cell pathways and lineage markers in the MPG suggesting improvement in EF following rhSDF-1 treatment is related to increased stem cell activity in the MPG and possibly increased neurovascular preservation