Prostatic Radiation Therapy Potentiates Erectile Dysfunction and Increases SDF-1 Expression in Erectile Tissues in Rats

Bethlehem H.M. Peters and Johanna L. Hannan

INTRODUCTION

- Prostate cancer is the most prevalent non-cutaneous neoplasm diagnosed in the United States. Prostate radiation therapy (RT), a leading therapy for prostate cancer, leaves 50% of men treated with erectile dysfunction (ED)
- The mechanism of prostate RT-induced ED is poorly understood
- Similarities in cavernous nerve injuries and RT-induced ED models may offer translation of investigative SDF-1 therapy in RT- induced ED.

Hypothesis

2 weeks post prostatic single-dose radiation will show no ED and no increase in SDF-1 expression in rats.

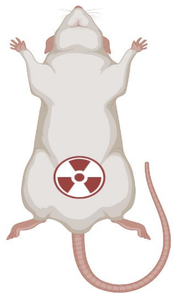
9 weeks post prostatic single-dose radiation will show ED and increases in SDF-1 expression in rats.

MATERIALS & METHODS

Animals: Male adult Sprague-Dawley rats (10 weeks old). The control group (n=6) did not undergo RT. RT rats were randomly assigned to 2 week and 9 week post-RT evaluation groups (n=7/group).

Radiation Therapy: 0 or 25 Gy single-dose prostatic radiation was administered to anesthetized rats via MultiRad350 small animal irradiator.

Erectile Function: Assessed by inducing erections using apomorphine a dopaminergic agonist at 2 weeks post radiation therapy.



Created with BioRender.com

RNA was isolated from the MPG and qPCR was preformed to measure expression of:

Stromal Cell-Derived Factor-1 **(SDF-1)**	Stem cell recruitment
C-X-C Motif Chemokine Receptor 4 (**CXCR4**)	SDF-1 receptor
Vascular Endothelial Growth Factor (**VEGF**)	Angiogenic inducer
Growth Association Protein 43 (**GAP43**)	Neural growth cone; axonal regeneration
Activating Transcription Factor 3 (**ATF3**)	Nerve injury marker
Glial Fibrillary Acidic Protein (**GFAP**)	Nerve repair; Schwann cell activation
Caspase 3 (**CASP3**)	Apoptotic marker
Beta-tubulin (**TUBB3**)	Mature nerve quantity
Neuronal Nitric Oxide Synthase (**nNOS-1**)	Nitrergic marker
Tyrosine Hydroxylase (**TH**)	Sympathetic marker

Stromal-cell Derived Factor-1 does Not Increase Immediately Following **Prostate Radiation Therapy**

No Erectile Dysfunction Evident Two Weeks Post Radiation Therapy

Department of Physiology
East Carolina University
Greenville, North Carolina 27858
petersb20@students.edu.ecu

RESULTS

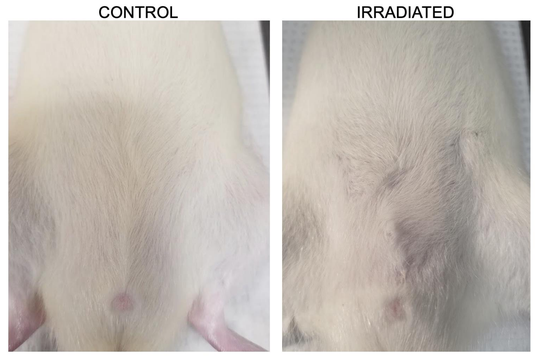
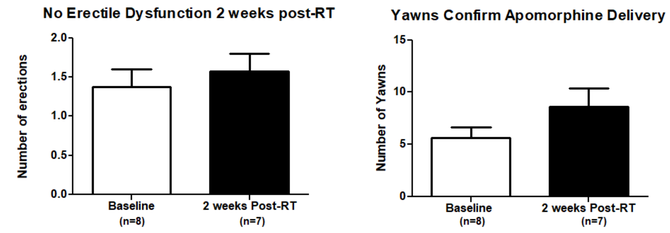


Figure 2: Abdominal hair loss evident at 2 weeks post-RT confirms radiation delivery



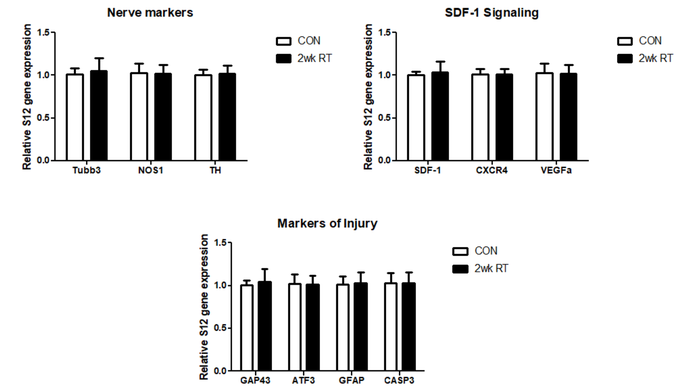


Figure 3: At 2 weeks post-RT, expression of all investigated genes were unchanged

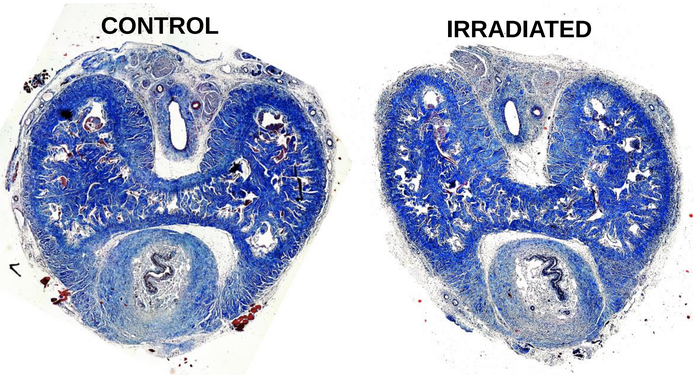
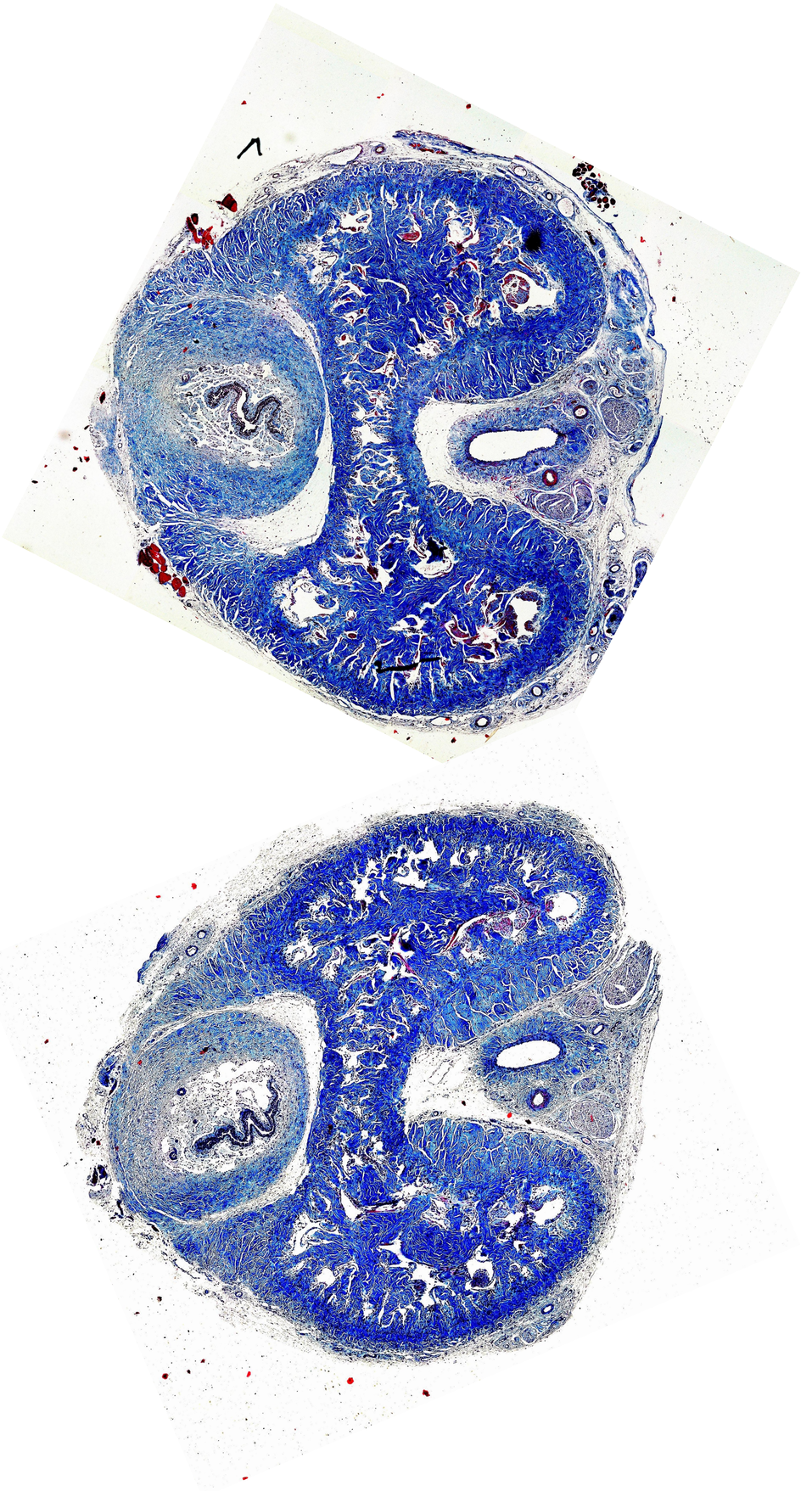


Figure 1: Histopathologic sections of penile shaft tissue stained with Masson Trichrome show no evidence of fibrosis(???) 2 weeks post radiation exposure (CITE)

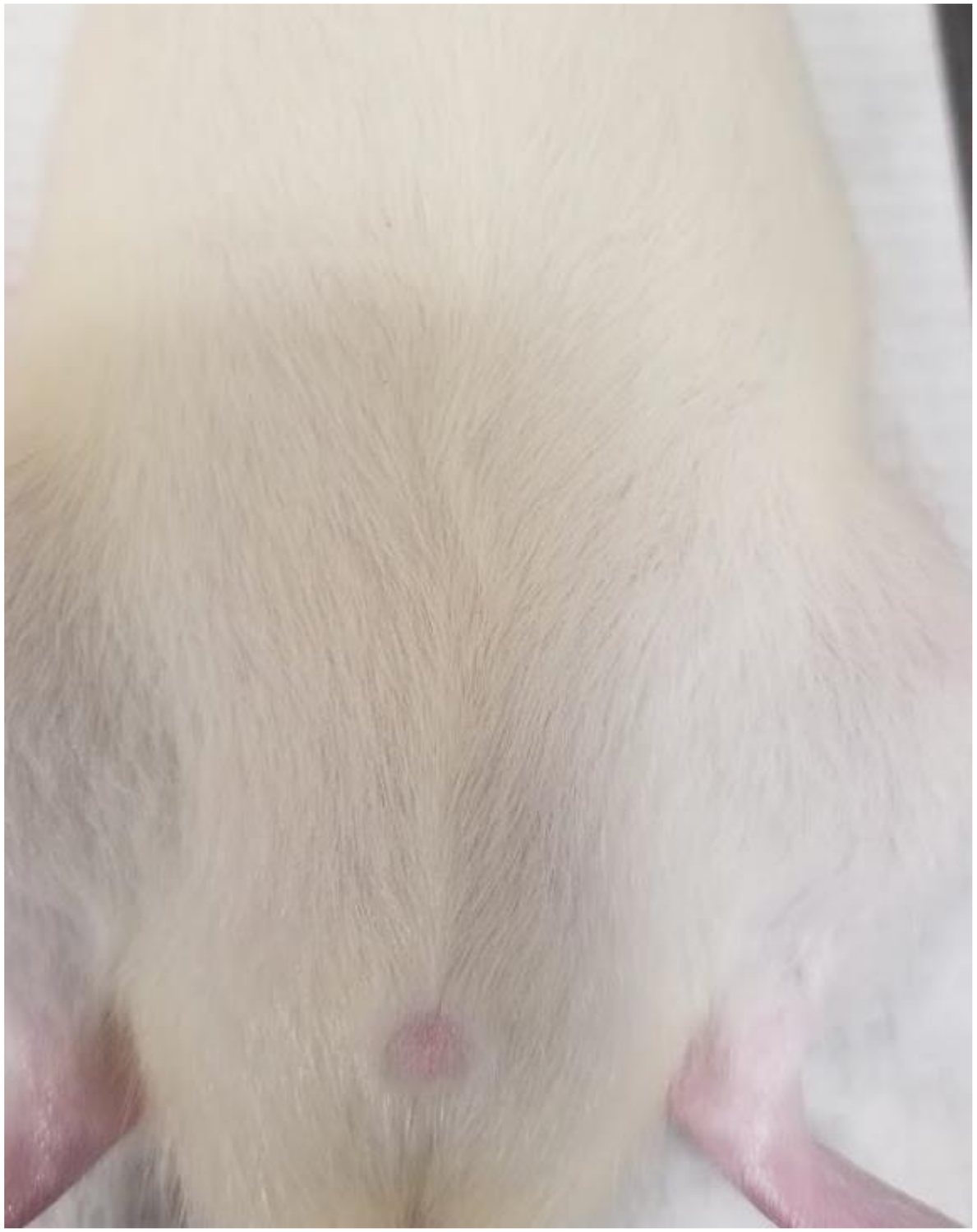


Markers

Stromal Cell-Derived Factor-1(**SDF-1**)	Stem cell recruitment
C-X-C Motif Chemokine Receptor 4 (**CXCR4**)	SDF-1 receptor
Activating Transcription Factor 3 (**ATF3**)	Marker of nerve injury
Growth Association Protein 43 (**GAP43**)	Neural growth cone; axonal regeneration
Glial Fibrillary Acidic Protein (**GFAP**)	Nerve repair; Schwann cell activation
Beta-tubulin (**TUBB3**)	Nature nerve quantity
Neuronal Nitric Oxide Synthase (**nNOS-1**)	Nitrergic marker
Vascular Endothelial Growth Factor (**VEGF**)	Angiogenic inducer

Stromal Cell-Derived Factor-1(**SDF-1**)	Stem cell recruitment
C-X-C Motif Chemokine Receptor 4 (**CXCR4**)	SDF-1 receptor
Vascular Endothelial Growth Factor (**VEGF**)	Angiogenic inducer
Growth Association Protein 43 (**GAP43**)	Neural growth cone; axonal regeneration
Activating Transcription Factor 3 (**ATF3**)	Nerve injury marker
Glial Fibrillary Acidic Protein (**GFAP**)	Nerve repair; Schwann cell activation
Caspase 3 (**CASP3**)	Apoptotic marker
Beta-tubulin (**TUBB3**)	Mature nerve quantity
Neuronal Nitric Oxide Synthase (**nNOS-1**)	Nitrergic marker
Tyrosine Hydroxylase (**TH**)	Sympathetic marker

CONTROL



IRRADIATED