

Memorial Sloan Kettering Cancer Center

# Enhanced intraoperative nerve visualization: proof of concept

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#### Disclosures

• No relevant disclosures



### **Study rationale**

• latrogenic neurological injury is a risk in genitourinary surgery

- Improving nerve visualization may reduce injuries
- No agents are currently approved

• Update our experience developing an agent to enhance nerve visualization during surgery.



#### Background

Initial rodent studies

You have access | Journal of Urology | Imaging Based Techniques & Uroradiology | 1 Apr 2018

#### V12-05 INTRAOPERATIVE NERVE VISUALIZATION WITH GE3126

Lucas W. Dean, Pedro Recabal, Dmitry V. Dylov, Cristina Tan Hehir, Aditya Bagrodia, Katie S. Murray, Sonia Sequeira, Erica Levine, Ouathek Ouerfelli, Jonathan A. Coleman, Peter T. Scardino, Vincent P. Laudone, and Timothy F. Donahue

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- 2018 AUA: presented nerve visualization
  - Laser & different formulation

- 2018 2020: Dog and porcine experiments
  - Technique & drug refined



## **Methods (equipment)**

• Illuminare-1: in-house designed myelin-binding fluorophore



- Modified FDA-approved laparoscope
  - white and blue light (370 424nm wave length) enabled







# Procedure

- Preparation
  - Pig positioned supine
  - Anesthetized by veterinary team
  - Abdomen insufflated
  - Lateral abdominal wall nerve identified
  - Scope positioned 2-3cm from abdomen & secured to a tripod
- Nerve fluorescence
  - Induction bolus of 0.5 1.4mg/kg Illuminare-1 administered
  - Camera toggled between white & blue light
  - Continued for up to 5 hours
  - Subjective and objective (signal-to-noise ratio) fluorescence assessed
- Completion
  - Specimens dissected for histology: H&E, myelin basic protein antibody
  - Pig euthanized peacefully





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#### Intraoperative findings

- Rapid uptake
- Sustained fluorescence > 2.5 hours
- Delineation of different tissues



# Histology

• Myelinated nerve in our histology samples (~200nm nerve fibers)







### Progress

- 2/2020 dog study obturator nerve and cavernous nerves
  - 7/7 histology: nerve.
  - Fibers as small as ~60 microns





# Conclusion

- Illuminare-1 enhances porcine and dog nerve visualization.
- Both large and very small caliber nerves fluoresce
- Fluorescence is sustained in dogs/pigs for at 2.5 hours

# **Future directions**

- Prepare for phase one in-human trial
- Explore additional equipment optimization

