Enhanced intraoperative nerve visualization: proof of concept

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Disclosures

• No relevant disclosures
Study rationale

- Iatrogenic 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

- 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
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.