

Ultrasound-Guided High-Intensity Focused Ultrasound Could Improve Neuroablation of the Sacroiliac Joint in a Swine Model

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INTRODUCTION

- Refractory SI joint pain can be treated with radiofrequency ablation, which can require 12 probes, and is time-consuming¹
- High-intensity frequency ultrasound (HIFU) could be a less invasive, more efficient and resource conscious option
- MRI, CT, and fluoroscopy have all been explored for HIFU image guidance for pain procedures^{2,3}
- Ultrasound-guided HIFU (USgHIFU) would allow for more time and resource-sensitive neuroablation and also would minimize ionizing radiation

MATERIALS AND METHODS

- Prospective technology safety and efficacy study
- MSKCC Animal Care & Use Committee-approved study (Protocol #21-12-009)
- Two healthy pigs underwent USgHIFU after general anesthesia
- Sonication performed via a USgHIFU prototype developed by FUSMobile, Inc. (Alpharetta, GA)
- 18 primary sonication targets (area between superior articulating process of sacrum and S3 for each pig).
- Following emergence, each pig was monitored for 72 hours for signs of pain and gait abnormalities

RESULTS

- **58% (21/36) of specimens suggested successful lesioning**
- Of the successful lesions:
 - 52% (11/21) included nerve lesions
 - 95% (20/21) included muscle lesions
 - 86% (18/21) included periosteum lesions
 - 95% (20/21) included bony lesions
- Spinal canal lesion
 - 28% (10/36) included spinal canal lesion
 - 19% (7/36) included injury epidural adipose
 - 8% (3/36) included injury nerve roots

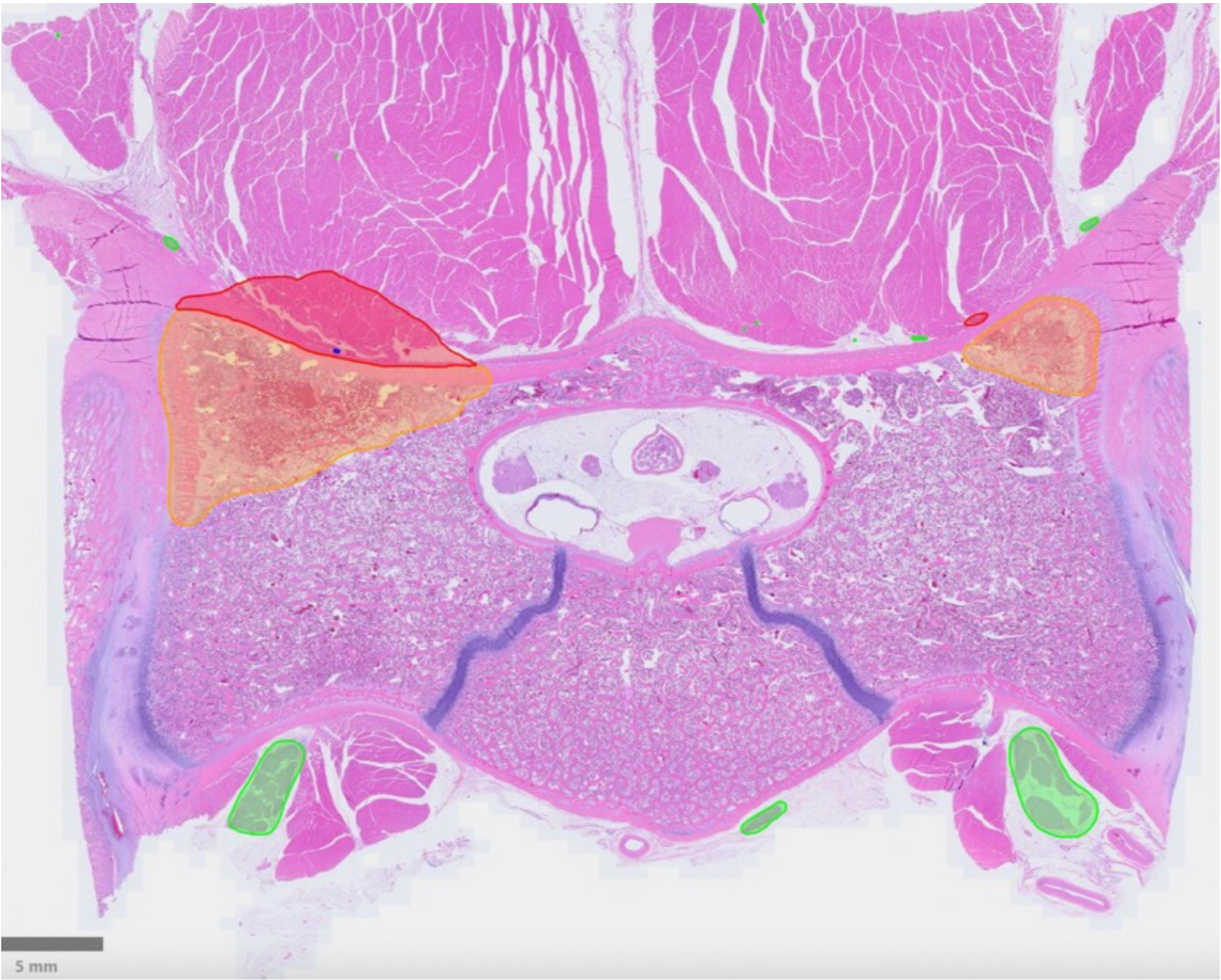
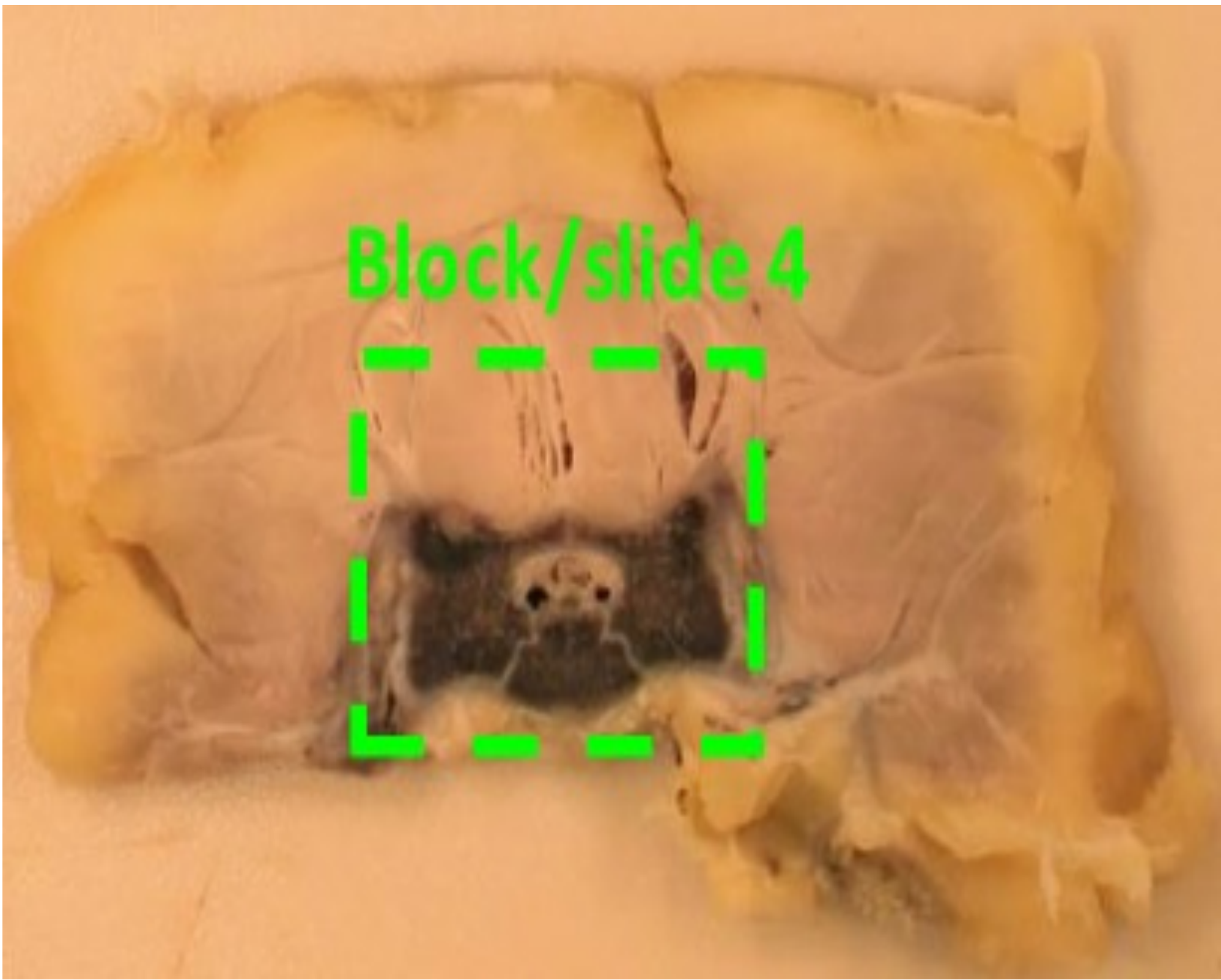


Figure 2: Left: Gross pathology slide of from axial cut of sacral spine. Right: Histologic specimen of an axial cross-section of the sacral spine of same slice (5mm).

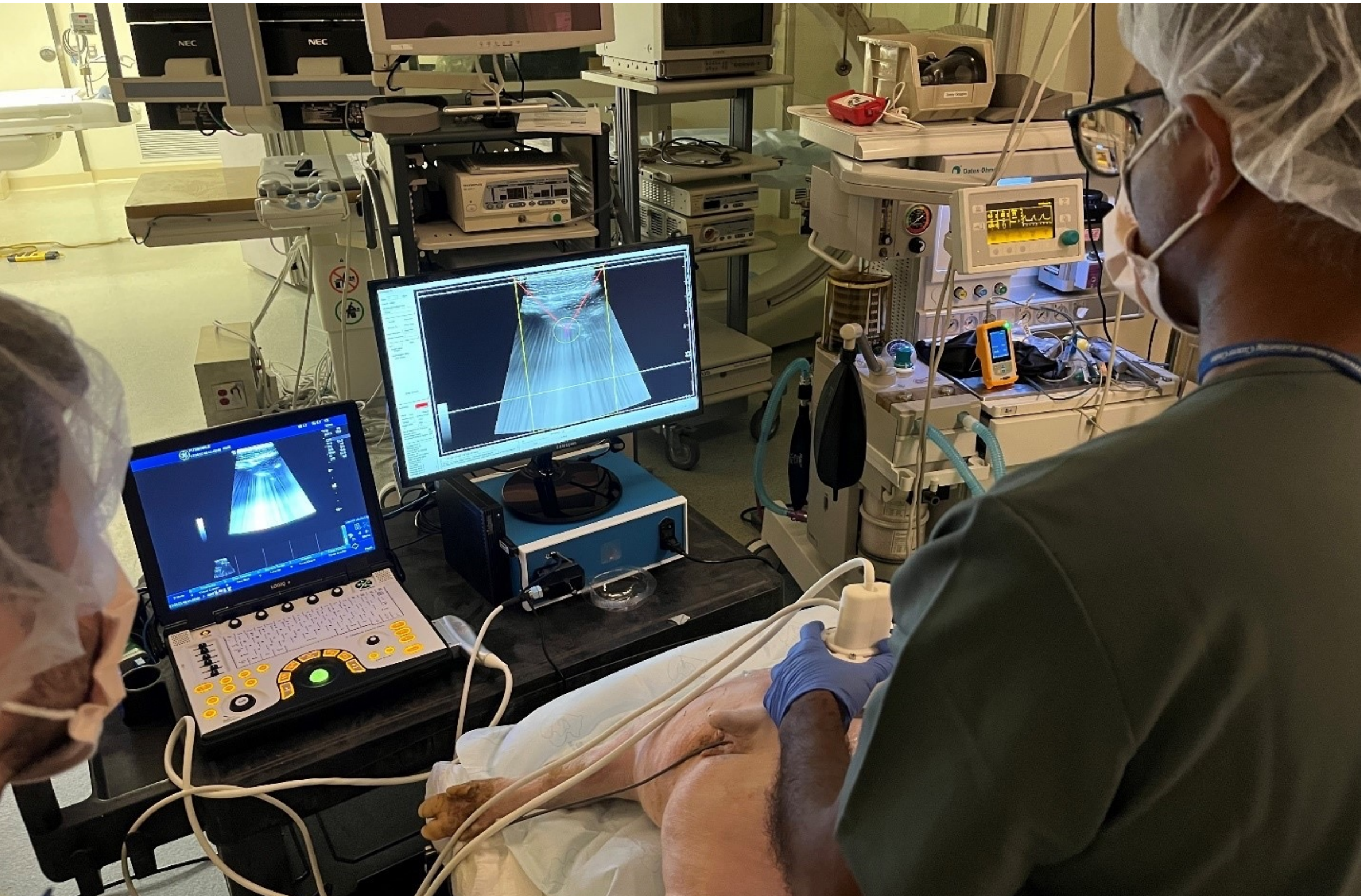


Figure 1: Photograph of the experimental setup. The USgHIFU prototype is connected to a GE LOGIQe ultrasound laptop (left screen), with a separate display monitor (right screen).

DISCUSSION

- USgHIFU could potentially be utilized to target sacral nerves
- Potential benefits include decreasing cost, time for procedures, resource utilization, and patient discomfort
- Future larger scale studies need to be conducted as operators become more experienced with the procedural components in order to ensure safety of the technology given the spinal canal ablation zones identified, and to assess for improved outcomes for those with refractory pain

REFERENCES

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