

# A Comparison of a Standard Radiofrequency Cannula to a Multi-tined Expandable Electrode in Determining Thermal Lesion Surface Area Size at the Muscle-Bone Interface in the Ex-Vivo Model

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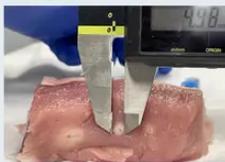
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## INTRODUCTION

- Monopolar radiofrequency ablation is a common interventional pain technique designed to treat spine pain.
- Inadequate disruption of the neural pathway has been proposed as a mechanism for inadequate therapeutic analgesia.
- Given the anatomical variation in the course of the neural target, a larger lesion size may enhance rates of success.
- A novel multi-tine radiofrequency electrode was introduced to produce a larger lesion. It relies on two tines that act to diffuse radiofrequency current density in the target tissue.
- This is the first study comparing lesion size between common monopolar electrode techniques and a multi-tine electrode.

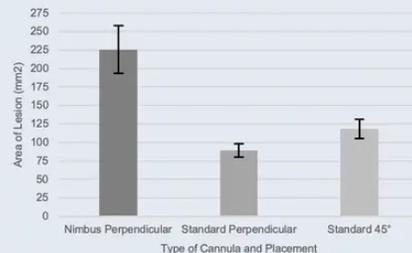
## METHODS

- Ex-vivo preservative-free porcine spines were obtained after industrial processing.
- Monopolar radiofrequency lesions were performed with 100mm, 18-gauge, 10mm active tip cannulas and 100mm, 18-gauge, 10mm active Nimbus multi-tine cannulas.
- Two single tine cannulas were utilized to reflect variance in clinical practice: one cannula was placed at a 90° perpendicular angle and one at a 45° angle to reflect variance in clinical practice (point lesion vs. parallel lesion).
- The multi-tine Nimbus needle was placed at a 90° perpendicular angle until bony contact was made, after which the tines were deployed.
- Prior to ablation, lidocaine was injected into each cannula to reflect clinical practice. Following ablation, the specimen was then dissected and the coagulation zone for each lesion was assessed.
- 126 lesions were performed on 42 separate samples, for a total of 42 lesions for each group.



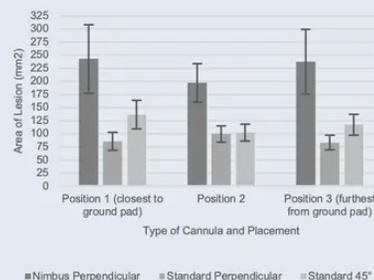
## RESULTS

Area of Lesion vs Type of Cannula and Placement



**Figure 1.** Mean area of lesion size for the Nimbus cannula with perpendicular placement was 225.64 mm, Standard cannula with perpendicular placement was 89.33 mm, and Standard cannula with 45° placement was 118.58 mm. (P<0.001)

Area of Lesion vs Type of Cannula and Placement Based on Distance From Ground Pad



**Figure 2.** No statistically significant difference in the mean lesion areas for each cannula type based on distance from the ground pad.

## DISCUSSION

- This study suggests that radiofrequency cannula design that accentuates the thermal ablation at contact with bone is likely to ablate the tissue structures at the bony surface.
- Using this protruding cannula to land one part on the transverse process and the other on the superior articulating process should increase the likelihood of ablating the medial branch nerve.
- Lesion size should be expected to be the same irrelevant of distance from the ground pad and efficacy is more dependent on the type of cannula used and position relative to the bony interface.
- Future studies should include a larger sample size and should include the marginal lesion area in lieu of the gross lesion area that we recorded.

## CONCLUSION

- The mean lesion area created by the multi-tined Nimbus needle was significantly larger compared to the Standard monopolar perpendicular and the Standard monopolar at 45°.
- It is our hope that this serves as a proof-of-concept for future studies that help elucidate differences with more accuracy and power to further evaluate the utility of the Nimbus cannula for the treatment of axial spine pain.

## REFERENCES

- Poetscher AW, Gentil AF, Lenza M, Ferretti M. Radiofrequency denervation for facet joint low back pain: a systematic review. Spine (Phila Pa 1976). 2014 Jun 15;39(14):E842-9.



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