

Full range of treatment settings and their effects on radiofrequency heat lesion size

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Changing the parameters used to deliver radiofrequency (RF) treatment greatly affects the size of the resulting heat lesion, researchers reported today in a study expected to deliver greater precision and more treatment options in interventional pain management. Results were presented at the 29th Annual Meeting of the American Academy of Pain Medicine.

"This is the most comprehensive study of radiofrequency heat lesion size for pain management to date," said the study's lead author, Eric Cosman Jr., PhD, scientific director of Cosman Medical in Burlington, Mass. "I hope these data suggest new and improved methods for physicians treating [chronic pain](#) syndromes."

Previous study in the field has tended to examine only a few parameters, leaving many questions unanswered. For instance, how does lesion size depend on active tip length, cannula diameter, set temperature and lesion time? What combination of those parameters can predictably and efficiently create lesions suited to the anatomical target? Are there lessons to be learned for placement technique? And, in general, how does one facilitate treatment and improve [patient outcomes](#)?

To gain answers, researchers tested every setting typically used in interventional [pain management](#) for cannula tip sizes, set temperatures and lesion times and documented the effect on lesion size. In the end, investigators created over 400 lesions in ex vivo [animal tissue](#) using tip diameters that ranged from 16 gauge (the largest) to 23 gauge (the smallest); tip lengths of 5, 10 and 15 millimeters; set temperatures from 60-90°C; and lesion times from 1-10 minutes.

The average lesion size was assessed using computer-aided photographic [temperature mapping](#) of 5-20 lesions per configuration, and modeled using finite-element analysis.

A number of effects on lesion geometry were seen. For example, increasing cannula diameter from 22 gauge to 16 gauge increased the average lateral lesion width by 65-69%, or 3-4 millimeters, at 80°C and 2 minutes. Increasing the set temperature from 60°C to 90°C increased the lesion width by 100-150% at 2 minutes. The lesions grew most rapidly after the first minute but were 12-21% wider at 2 minutes, and 23-34% larger at 3 minutes, compared with 1 minute. The length of the lesion was increased in relation to larger tip size, higher temperature and longer lesion time. Lesion length exceeded tip length by 1-5 millimeters at 80°C and 2 minutes.

The results will help inform the selection of equipment and generator settings to conduct RF treatments, the authors said.

Dr. Cosman said it has been exciting to see this happening in relation to sacroiliac joint (SIJ) pain treatment following a similar study he helped complete on bipolar RF heat lesion size (Cosman & Gonzalez, *Pain Practice* 2011; 11(1):3-22). In the treatment of SIJ pain, there is a need to create different size [lesions](#) because it is difficult to target the multiple lateral branch nerves innervating the joint. The bipolar RF "Palisade" lesioning method has been proposed for the treatment for SIJ [pain](#) as an alternative to steroid injections, which are frequently performed but have little evidentiary support that they are beneficial over the long term.

The researchers concluded that cannula gauge, tip length, set temperature and lesion time all substantially affect heat lesion width and length. These parameters should be considered in performing RF treatments.

Provided by American Academy of Pain Medicine

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