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A Device that Allows for Multiple Simultaneous Radiofrequency (RF) Ablations in Separated Areas of the Liver with Impedance-controlled Cool-tip Probes: An ex Vivo Feasibility Study

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**Start Time:** 11:57 AM

**End Time:** 12:03 PM

**Location:** Room E450B

**Presenter(s) Abstract:**

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Purpose: Commercially available RF ablation systems are capable of driving only one electrode at a time. A device was created that distributes power from a RF generator across two separate Cool-tip electrodes (Radionics, Burlington, MA) using an electronic switch and a PC. Impedance feedback data were utilized from both probes to employ impedance control. This study demonstrates the feasibility of simultaneously creating multiple ablation zones with impedance-controlled Cool-tip probes using a switching device to distribute power across multiple probes.

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Methods and Materials: All lesions were created using a 200 W RF generator (Radionics, Burlington, MA) with 12 min ablation time. Four fresh bovine livers were acquired from a local butcher. A total of 20 RF lesions were created using either a single probe (n = 10), or two probes running simultaneously in two locations (n = 10) separated by at least 10 cm. Our prototype device consisted of an electronic switch that was controlled by a PC. The device measured impedance between each probe and the grounding pad. If the impedance of either probe rose above 120% of baseline value, no power was delivered to that probe for 15 s. After ablation lesions were sectioned and lesion dimensions were measured.

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Results: No difference was detected in lesion size for individual ablation sites between single and dual probe ablations. Mean lesion diameter was  $2.8 \pm 0.4$  cm for single ablations and  $3 \pm 0.4$  cm for simultaneous ablations (p = 0.29, student's t-test). Mean cross-sectional area was  $5.8 \pm 1.8$  cm<sup>2</sup> and  $6.6 \pm 1.4$  cm<sup>2</sup> respectively (p = 0.27).

Conclusion: Multiple sites of ablation can be created simultaneously using this electronic switch. Individual lesions are the same size regardless of whether they are a single or dual burn. Thus, two ablations

may be performed without time penalty and without compromising lesion size. This could be used to simultaneously ablate several different tumors, or to create a larger zone of necrosis when probes are deployed in close proximity to each other.