

Title:	A Device That Allows for Multiple Simultaneous Radiofrequency Ablations in Separated Areas of the Liver: A Feasibility Study in the Porcine Model
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Abstract:

Purpose: Commercially available RF ablation systems are capable of driving only one single or multiprong electrode at a time. Clinical practice rarely requires the entire power output from a RF generator throughout an entire ablation. A device was created that distributes power from a RF generator across two separate electrodes using a switching device. Temperature feedback data was utilized from both probe thermosensors. This study demonstrates the feasibility of simultaneously creating multiple ablation zones using a switching device to distribute power across multiple probes.

Methods and Materials: Three domestic pigs were anesthetized and the liver exposed. A total of 13 RF lesions were created using either single (n=3), or dual probes running simultaneously in separate hepatic lobes (n=10). All lesions were created using a 150 Watt generator (RITA, Irvine, CA) for 10 minutes at a target temperature of 100oC with prongs at 3 cm. For dual ablations, probe temperatures were measured and power applied alternating between the two probes. Temperatures were transferred to a computer which controlled the period for which power was applied to each probe via an electronic switch, so that both probes stayed at roughly equivalent temperatures.

Results: No difference was detected in lesion size for individual ablation sites between single and dual probe ablations. Mean lesion diameter was 3.33 ± 0.57 for single ablations and 3.76 ± 0.60 for dual ablations. Mean volume was 10.67 ± 6.00 and 17.32 ± 8.64 respectively ($p > 0.05$, student's t-test). Mean time until target temperature was reached was 2.73 minutes for single probe ablations and 3.37 minutes for dual probe ablations ($p > 0.05$, student's t-test).

Conclusion: Multiple sites of ablation can be created simultaneously using this switching device. Individual lesions are the same size regardless of whether they are a single or dual burn. Thus, two ablations may be performed without substantial 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.