

# Summary

## Comparative MWA study

Comparative Study of Ablation Zone of Emprint™ HP Microwave Device with Contemporary 2.4 GHz Microwave Devices in an Ex Vivo Porcine Liver Model

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## Comparative study

### Introduction

Assuming most tumors are round, the ideal ablation zone is one that is large enough to encase the target lesion and achieve adequate margin as well as one that is spherical, to minimize non-target parenchyma damage along the axis of the applicator and avoid body wall burns.

This study compares the ablation zones of four commercially available microwave ablation (MWA) manufacturers (Emprint™ HP, ECO, NeuWave™, Solero) in an ex vivo porcine liver model.

### Materials and methods

A total of 204 ex vivo porcine liver samples were included in the analysis. Single-applicator and triple-applicator ablations were performed.

The ablation zones' long- and short-axis diameters were scanned and measured.

### Results and conclusion

In conclusion, the new-generation Emprint™ HP system produced the most spherical ablation zones at maximum system settings and at maximum power for three minutes (sphericity index: 0.9). A spherical ablation zone will increase the chance of achieving an even ablative margin around the tumor while minimizing non-target tissue damage.

### Discussion

#### Why are spherical ablation zones important in liver ablation?

To ensure curative ablation and minimize the risk of local tumor progression, a circumferential safety margin of at least 5 mm is paramount to successful ablation. Manufacturers attempt to overcome this by increasing power to increase the volume of the ablation zone; however, the inherent ellipsoidal shape of most MWA systems pose two main challenges when ablating a round tumor.

Firstly, without adequate width short axis diameter (SAD), obtaining side-to-side ablation margin may not be possible with a single antenna position, requiring overlapping ablations either by re-positioning the antenna or by inserting a second or third antenna into the threatened margin. Secondly, due to the increased length of the ablation zone long axis diameter (LAD), there is an increased risk of non-target tissue damage.

A spherical ablation is ideal for achieving an even ablative margin around the tumor, assuming a well-centered antenna with minimum non-target tissue damage.

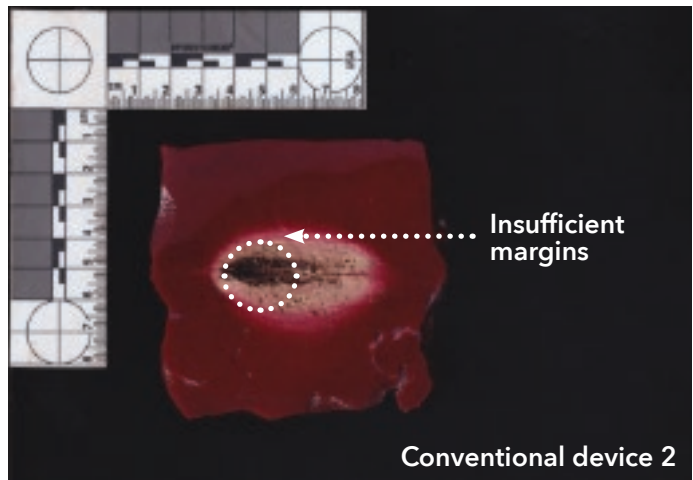
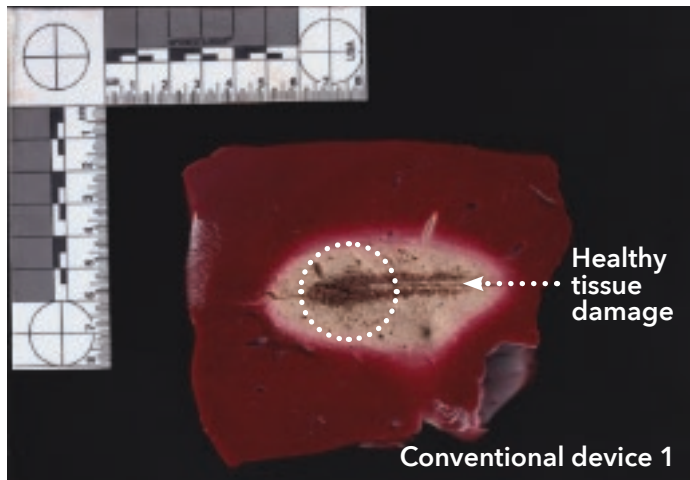
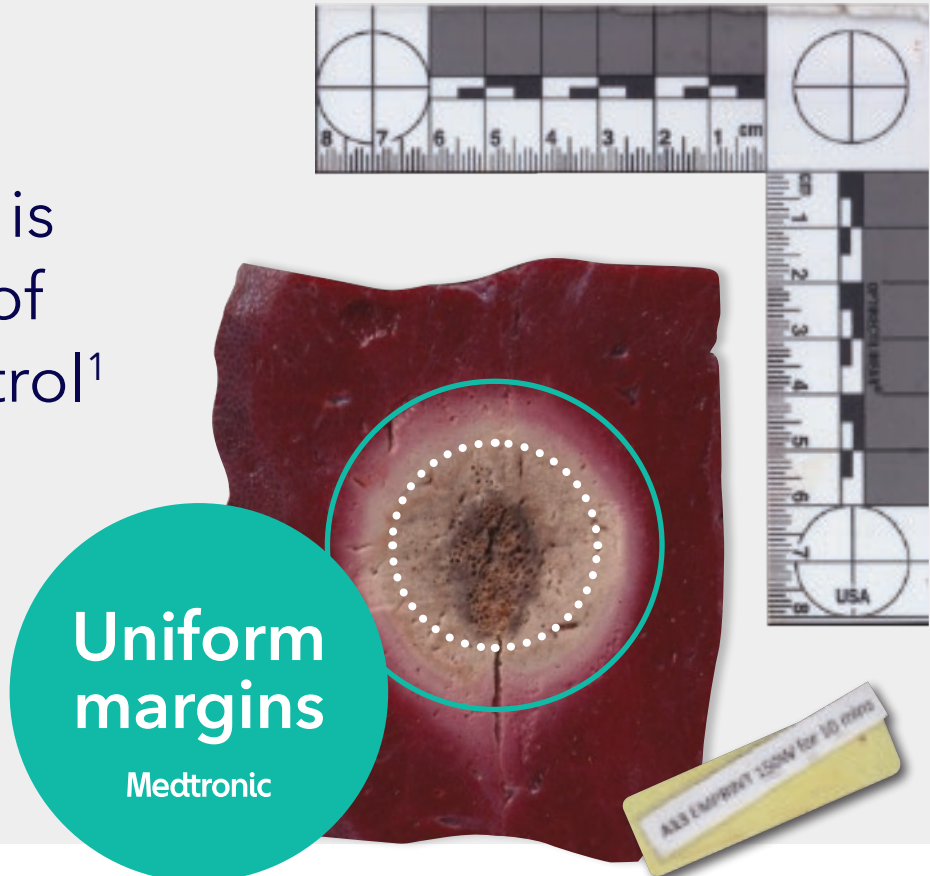
At maximum system settings, the Emprint™ HP system produced large ablation zones, comparable to ablation zones produced by the NeuWave™ system, which used simultaneous activation of three antennas.

Using a single antenna to achieve the desired large spherical ablation zone would avoid the complexity of placing multiple antennas, possibly reducing the risk of bleeding and tumor seeding with each antenna insertion, and reduce the cost to the patient.

## Clinical impact

# Ablative margin is a top predictor of local tumor control<sup>1</sup>

A spherical ablation zone will increase the chance of achieving an even ablative margin around the tumour while minimizing non-target tissue damage<sup>2</sup>



1. Wang, X.; Sofocleous, C.T.; Erinjeri, J.P.; Petre, E.N.; Gonen, M.; Do, K.G.; Brown, K.T.; Covey, A.M.; Brody, L.A.; Alago, W.; et al. Margin size is an independent predictor of local tumor progression after ablation of colon cancer liver metastases. *Cardiovasc. Intervent. Radiol.* 2013, 36, 166-175
2. Comparative Study of Ablation Zone of EMPRINT HP Microwave Device with Contemporary 2.4 GHz Microwave Devices in an Ex Vivo Porcine Liver Model Terrence C. H. Hui, Guo Yuan How, Michelle S. M. Chim and Uei Pua. <https://doi.org/10.3390/diagnostics13162702>

[View the study here](#)

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