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Microwave ablation assisted by a computerised tomography–ultrasonography fusion imaging system for liver lesions: An *ex vivo* experimental study

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Purpose: To investigate the feasibility and validity of real-time guidance using a fusion imaging system that combines ultrasonography (US) and computerised tomography (CT) information in the targeting and subsequent microwave ablation of a liver target inconspicuous on US.

Materials and methods: The study was an experimental *ex vivo* study in calf livers with internal targets, simulating a focal liver lesion, focused on the accuracy of real-time US using a multimodality fusion imaging system in combination with 15 gauge (G) microwave antennae. US image and pre-procedural CT image were fused by the external markers registration procedure. Microwave antennae were inserted into the liver to ablate the target assisted by the CT-US fusion imaging system. Finally, a post-procedural CT with needles in situ and multiplanar reconstructions were performed to compare with pre-procedural CT information in order to calculate the accuracy of positioning (distance between the needle tip and the target).

Results: Eight insertions were planned and eight ablations were performed in four calf livers. The calf livers were undertaken successfully on external markers registration procedure. The mean registration error in the four livers was 2.1 ± 0.1 mm, 2.8 ± 0.1 mm, 3.4 ± 0.1 mm and 2.3 ± 0.1 mm, respectively. The accuracy of the matched US-CT images was very satisfactory in the fact that it was found there was a mean discrepancy of 1.63 ± 1.06 mm.

Conclusion: Real-time registration and fusion of pre-procedural CT volume images with intraprocedural US is feasible and accurate for microwave (MW) ablation in experimental setting. Further studies are warranted to validate the system under clinical conditions.

Keywords

[fusion imaging](#), [microwave ablation](#), [ultrasound guidance](#)