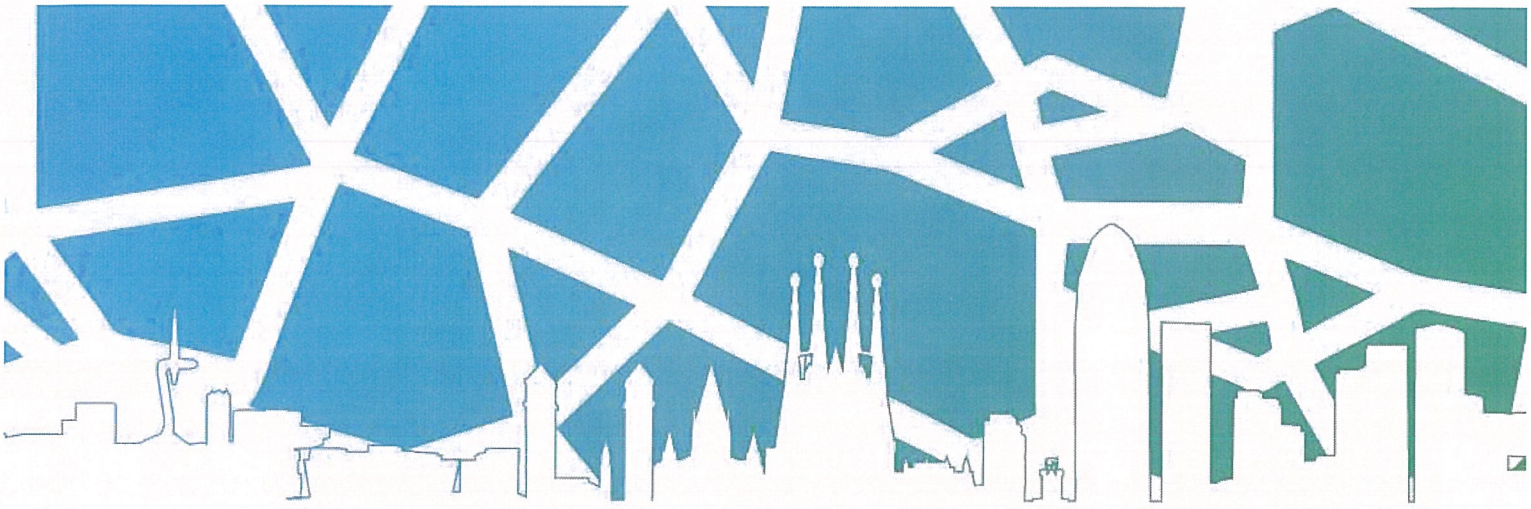

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ABSTRACT BOOK

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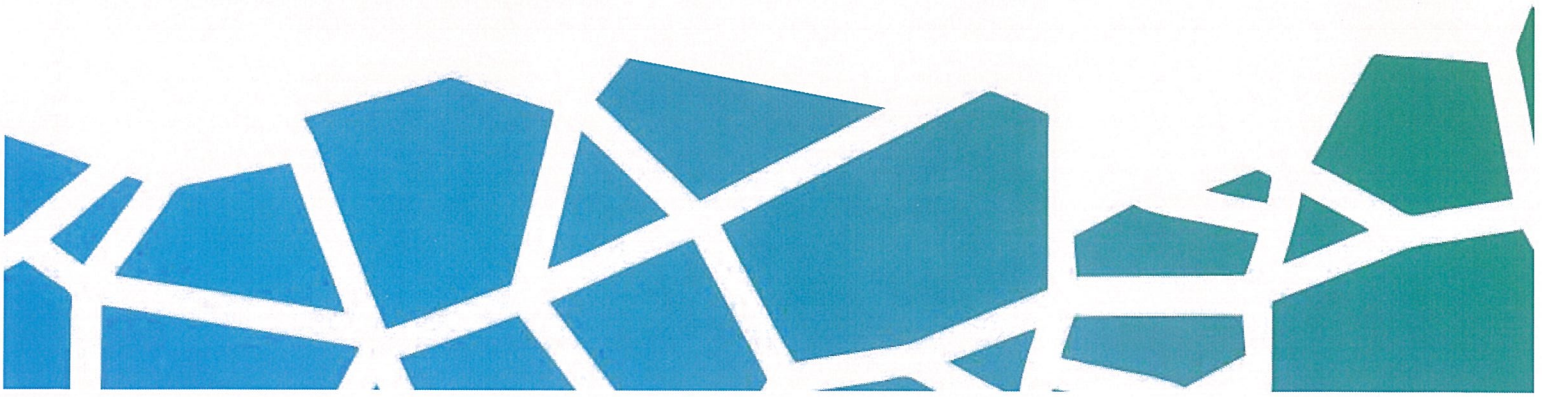

EXPERIMENTAL EVALUATION OF THE IMPACT OF ULTRASOUND EXPOSURE PARAMETERS ON NECROTIC LESIONS INDUCED IN TISSUE BY A ROBOTIC ULTRASOUND-GUIDED HIFU ABLATION DEVICE FOR TREATING SOLID TUMORS IN SMALL ANIMALS

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OBJECTIVES

We have designed and built a robotic Ultrasound Imaging-guided HIFU (USIgHIFU) ablation device for destroying solid tumors in small animals. Before the device is used, series of experimental studies on *ex vivo* tissues were needed to assess the location and extent of necrotic lesions induced. The objective of this studies was to evaluate the impact of sonication parameters on necrotic lesions induced in tested tissue during less than 3s. The results of this studies were necessary to determine the step and speed of the HIFU beam movement to cover with necrosis the whole treated volume.

METHODS

The HIFU beam was generated by a bowl-shaped, 64-mm transducer (*f*-number 0.98) operating at 1.08MHz or 3.21MHz. Multiple thermal lesions were created within *ex vivo* pork loin tissue at a 12.6mm depth below its surface during 3s of exposure. Beams with the same duty-factor and varying pulse duration (30μs-300ms) or with the same pulse duration and varying duty factor (0.2-0.8) propagated in two-layer media: water/tissue (50mm/40mm) were studied. The *in situ* intensity was estimated assuming nonlinear propagation model.

RESULTS

Dependence of lesion dimensions on frequency, pulse duration and duty-factor was determined.

CONCLUSIONS

Lesion extent depended strongly on frequency and duty-factor, but slightly on pulse duration. The lesions created by shorter pulses were hardly visible on ultrasound images. Based on the experimental results the HIFU beam acoustic parameters, the step and speed of its movement to cover the whole treated tissue volume were designated.

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