

## **Temperature modeling of therapeutic ultrasound: a preliminary finding**

### **Abstract**

The temperature model of therapeutic ultrasound for human tissue is important in order to design an accurate instrumental assessment and calibration of therapeutic ultrasound device. The focus of this study is to verify temperature effects of ultrasound on tissues and explore the possibility of proposing a preliminary temperature model. A series of experiment had been conducted to clarify the relationship between output intensity and site of target tissue with temperature change in a phantom-tissue model for 10 minutes exposure of 3 MHz therapeutic ultrasound. It was found that 3 MHz ultrasound provided effectual heating at the superficial tissue, which is 1 cm from surface. It was also found that the experimental data had provided the necessary evidence for the development of preliminary temperature model. The temperature model had been produced by selecting suitable trend line for the graph of experimental data particularly for the temperature change at site of 1 cm from tissue surface. In conclusion, the preliminary finding of this study is the temperature effect of therapeutic ultrasound in homogeneous phantom tissue model has a suitable pattern to be modeled into a simple mathematical equation. This study also proposed further study to develop more reliable and holistic evidence-based temperature model.

**Keywords** — Temperature modeling, therapeutic ultrasound